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Report of the Commission of Inquiry on Aviation Safety

Volume 3

6

REPORT OF THE

COMMISSION OF INQUIRY

ON AVIATION SAFETY

Commissioner
The Honourable Mr. Justice Charles L. Dubin

February 1982

VOLUME 3

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PREFACE

TO: The Honourable Jean-Luc Pepin
Minister of Transport

Dear Mr. Minister:

I am pleased to submit herewith the third and final Volume of my Report.

In Volume 1, in addition to matters of general application, there were included my conclusions and recommendations on the subject matters of Accident and Incident Investigation and Reporting as well as on the relationship of accident investigators and provincial coroners when inquiring into a fatal aircraft accident.

In Volume 2, I dealt with the subject matters of Enforcement, Airworthiness and Departmental Aircraft.

In this concluding Volume, I have examined into the very difficult and important subject matters of Navigational Aids and Uncontrolled Airports, and Personnel, and I have also added a Chapter on the subject matter of Search and Rescue.

Schedule "A" lists all those who participated with respect to the subject matters reported on in this Volume.

By dividing the Inquiry into subject matters and conducting the hearings in phases, I have endeavoured to the best of my ability to deal with the very broad terms of reference set forth in the Order in Council pursuant to which I was appointed. It was quite impossible for me to deal with all matters raised. I have selected those which I think were the most urgent. The Air Administration has now the benefit of the entire record, and there were many other matters raised which I think are worthy of its attention.

With this Volume my mandate will have been completed, and I have devoted all my energy in an endeavour to do justice to all the efforts made by the many who appeared before me.

Before concluding my Report, I would be remiss if I failed to advise you about the Commission staff who assisted me in carrying out my responsibilities.

Pursuant to the Order in Council, I was given the right of access to personnel and information within the Department of Transport. Those within the Air Administration cooperated in every respect, not only in responding to our inquiries but also addressing in a very full and forceful way the many aviation safety issues dealt with. In addition to their attendances and participation at the public hearings, it was necessary to obtain voluminous documentation and files from within the Air Administration. In order to be able to do this without disrupting the day-to-day activities of the Air Administration, Mr. Walter Gadzos, a senior employee within the Air Administration was assigned as a liaison officer to whom requests for files were made, and, who, in turn, obtained them from the Air Administration. He made a very important and significant contribution to the work of the Commission and carried out this delicate assignment with the highest integrity and sense of duty to both the Commission and the Air Administration.

Following a rather shaky start from an administrative point of view, Miss Joanne Gadsby was seconded to the Commission as its Executive Director. She took charge of the many administrative details of the work of the Commission and organized the public hearings, which were conducted across the country. In order to endeavour to complete the Commission as expeditiously as possible, but with a view to affording to everyone who wished to present evidence a full opportunity to do so, there was tremendous pressure on Miss Gadsby to have the facilities and services available in the various communities in which we attended and with little delay, as we moved from one place to another. In this respect, she was assisted by Rollande Froment, Lise Poirier, Suzanne Lalonde and Emily Pless who each, in turn, attended with the Commission at its many public hearings and were responsible for accommodations, translation services, shorthand reporters, exhibits, filing and the like. When their task was completed, they left the Commission to undertake other assignments, but I am very much indebted to them for the efficient manner in which our hearings were conducted.

Miss Mary Rukavina was with the Commission from its outset and has continued to the end in charge of our office in Toronto. In addition to the many administrative duties which befell her, she assumed control of the transcripts of testimony, the voluminous exhibits and the organization of all the material. She had a great facility, on a moment's notice, to be able to find any document, exhibit or portions of the testimony when requested to do so, all of which was of particular assistance in the preparation of the final Report. When Miss Gadsby left the Commission to take an assignment with the Treasury Board, Miss Rukavina also assumed the duties of Executive Director. Her efficiency was favourably commented upon by all those who came into contact with our office. In addition to assisting Commission Counsel throughout the Inquiry as a secretary, it was her task to complete on a word processing machine the volumes of this lengthy Report in their final form.

In the early days of the Commission she was assisted by Miss Barbara Corder until Miss Corder left the Commission to take up other employment.

When Miss Corder left, in her place we were fortunate to obtain the assistance of Miss Charlotte Neyedli, a very prodigious worker, and whose warm personality eased the tensions of the latter days of the Commission when all of us were endeavouring to complete our task.

Miss Mary Harding is worthy of a particular word of praise and expression of appreciation. Miss Harding was my legal secretary for many years while I was at the Bar and continued with me at Osgoode Hall on my appointment to the Bench. It was her lot to assume the most difficult task of all. In addition to her many other duties, the entire manuscript was first dictated to Miss Harding who, in turn, from her shorthand notes was required to transcribe the original drafts and, subsequently, as my editor, guided me through the various subsequent drafts of the Report into their final form. I owe her a special debt of gratitude.

On the technical side, Messrs. Robert F. Carducci, (Professional Engineer), Russell J. Thatcher, (Airline Maintenance Consultant), and Captain C. Robert MacWilliam, pilot, Air Canada, (Operations) provided invaluable technical knowledge to the work to the Commission. In addition, as was noted in the Report, Messrs. MacWilliam and Thatcher

undertook an extensive field study of the operations of many of the smaller aircraft carriers across the country. In the Province of Quebec, Mr. Thatcher was assisted in that task by Captain Pierre Menard, pilot, Quebecair. These studies led the Commission to inquire into many of the most significant matters during the public hearings.

In the last year of the Inquiry, by a good stroke of fortune, Mr. Robin Nunn joined the staff of the Commission. An Honours Graduate in Science of Queen's University and presently a student-at-law at the University of Toronto Law School, Mr. Nunn is a pilot of many years' experience and holds a flight instructor's rating. Although he did not join the Commission until the public hearings had been completed, he analysed the entire transcript and all the exhibits and performed a thorough and able service as our Director of Research.

On the legal side, I was able to obtain the services of John Sopinka, Q.C., of Toronto, as Counsel to the Commission. While at the Bar I had the opportunity of serving on many Royal Commissions in various capacities, I have never observed anyone perform the difficult task of a Commission Counsel as masterfully as did Mr. Sopinka as Counsel to this Commission. He assumed the responsibility for the organization of the entire Inquiry. He developed a particular expertise in the subject matters with which he dealt. He was thorough, fair and courteous.

Mr. Gary Q. Ouellet, of Quebec City, was retained as Associate Counsel and was a very skillful associate of Mr. Sopinka throughout the course of the Inquiry. In addition to being responsible for the examination of the witnesses who testified in the Province of Quebec and by others who addressed the Commission elsewhere in the French language, he assisted Mr. Sopinka in the organization of the Inquiry in all its phases. He was also thorough, fair and courteous.

Mr. Sopinka and Mr. Ouellet were both indefatigable, and I gained much from their advice in arriving at my conclusions and recommendations.

In order to expedite the hearings as we travelled from city to city, Mr. Stephen J. Mulhall, of Vancouver, was retained to assist Commission Counsel for our hearings in Vancouver, and Mr. Ian F. Kelly, of Newfoundland, for our hearings in Northern Ontario

and in Halifax. Although with the Commission for only a short time, they performed their task in an extremely capable manner.

Mr. Scott W. Fleming, a student-at-law, also spent some time with the Commission. He is a bright and promising young man, who had the added qualification of being a pilot, and served the Commission well.

In the early days, Mr. Arthur E. Lorenz, who specialized in aviation law, joined the Commission as a Research Director and assisted Mr. Sopinka and Mr. Ouellet in the Airworthiness Phase of the Inquiry with diligence. He left the Commission after the Airworthiness Phase to join the legal department of Air Canada.

I was very fortunate to have had the assistance of such loyal and dedicated colleagues. In my opinion they not only served me well, but they have all acted in the public interest and have contributed much to aviation safety in Canada.

The Inquiry has disclosed that there is much to be done to improve Canada's aviation safety record and to forestall any diminution of aviation safety in the future. There is no room for inertia or complacency. The task ahead must be approached with a sense of urgency. I am confident that that challenge can and will be met.

I appreciate, Mr. Minister, the support that you have given to the work of this Commission. I trust that I have been of some service to you.

All of which is respectfully submitted.

Charles L. Dubin

Charles L. Dubin.

October 28, 1981

CHAPTER I

NAVIGATIONAL AIDS AND UNCONTROLLED AIRPORTS

INTRODUCTION

As of March 31, 1980 there were 22,698 aircraft on the Canadian Civil Aircraft Register, of which 18,324 had a valid existing certificate of airworthiness or a flight permit; 72% of the aircraft were privately owned, 26% owned by commercial carriers and 2% state aircraft, either federal or provincial; 88% of the aircraft on the Register were small single-engined planes which were used for both commercial and private purposes. There are also over 100 corporate jets in use.

As of the same date, there were 59,963 licensed pilots with an additional 25,602 student pilot permits in force.

As of January 1, 1980 there were approximately 1,111 licensed airports in Canada, of which 611 were land airports, 360 water airports and 140 heliports. Of the licensed airports, 63 have control towers manned by air traffic controllers and operated by Transport Canada, and for the purposes of this Report are designated as controlled airports. The balance of the licensed airports are regarded as uncontrolled airports, some, but not all by any means, have flight service stations manned by flight service specialists.

In 1978, there were 696 accidents in Canada, of which 93 were fatal accidents, resulting in 247 fatalities. In 1979, there were 725 accidents, of which 108 were fatal, also resulting in 247 fatalities. The number of accidents in 1979 was the highest in the ten-year study recorded in Volume 1, as were the number of fatal accidents. The fatalities in 1978 and 1979 were also the highest in the ten-year period under study.

On a national basis, approximately, 40% of accidents occurred on landing, 26% on take-off, 5% on taxiing and 29% enroute.

Air navigational facilities and services are designed to ensure the safe and expeditious movement of aircraft and can and do reduce the risk of accidents. There is an

interrelationship between the air navigational facilities provided by Transport Canada and the airport, the aircraft and the pilot. However, there is a limit to the financial and manpower resources available to provide modern air navigational facilities and services to all users of aircraft. How best to use the resources available and in a manner which would best enhance aviation safety was the subject matter of the extensive submissions and briefs which the Commission heard in this phase of the Inquiry.

The subject matter has been constantly under review by the Air Administration and affords of no easy solution. There were many who took issue with the methods used in such review process, and with the criteria established by the Air Administration in the allocation of air navigational facilities and services across the broad expanse of Canada where aircraft fly.

The subject of navigational facilities and services is, in many respects, highly technical. A brief outline in non-technical language of the navigational facilities and services available is necessary to appreciate the many issues raised in this important area and is set out below:

RADIO NAVIGATION

In order to navigate, a pilot must know the location of his aircraft and in what direction it is presently travelling.

The least sophisticated way requires the pilot to look out the window at a known landmark and compare what he sees on the ground to what appears on his map. Although this method is used at times by even the largest aircraft, the job of navigation is simplified by radio navigation. The most common radio navigation system in use today is called "very high frequency omni-directional range" (VOR). VOR relies upon a radio transmitter on the ground that broadcasts a signal on the very high frequency (VHF) band which is adjacent to the FM radio band on the radio frequency spectrum. An aircraft VOR receiver interprets this broadcast for the pilot in terms of direction from the transmitter. A separate transmitter operating on the ultra high frequency (UHF) band is sometimes located with the VOR. This signal is converted by an airborne receiver into a display of the number of nautical miles between the aircraft and the transmitter. The

system is known as Distance Measuring Equipment (DME). The military have their own design similar to VOR/DME, called TACAN, and when this is located with a VOR, the installation is called VORTAC. With both systems, rather than needing to look out the window at a landmark, the pilot can tell where he is in relation to a navigational aid within reception distance by simply reading his instruments. The reception distance may be as much as 200 miles at high altitude. At 1500 feet above ground level, this distance is reduced to 50 miles or less. If the aircraft is at low altitude, obstacles between the aircraft and the transmitter will interfere with the signal. Another transmitter commonly used in Canada is the non-directional beacon (NDB). The signal is much like that of a commercial AM broadcast station. Because it uses the low or medium frequency band (LF/MF), the signal is not limited by line of sight. However a NDB has its own disadvantages such as static interference from thunderstorms. The airborne radio receiver which a pilot uses to find his position relative to a NDB is called an automatic direction finder (ADF). Large transport aircraft and many small private aircraft carry ADF, VOR and DME receivers. An additional device becoming more common is an airborne computer that uses VOR and DME signals, called RNAV. In an emergency, control towers and flight service stations can provide navigational assistance from the ground. With the voice carrier signal from the aircraft communication radio, an operator on the ground can determine the aircraft's position with direction finding (VDF also called VHF/DF) equipment.

The simplest device for determining direction is the magnetic compass. The floating magnetic compass familiar to the layman presents certain difficulties in an aircraft. For instance, turbulence makes it difficult to read. Aircraft may therefore have compasses adapted with gyroscopes and with devices that sense the earth's magnetism in other ways, but they are all variations on the same theme. Indeed, even jumbo jets carry a simple magnetic compass.

The inertial navigation system (INS) used in large transport aircraft, unlike the above navigational aids, is not dependent on ground transmitters. The INS measures accelerations which are interpreted by a computer in terms of speed and distance covered. Even this advanced navigational aid is still designed to tell the pilot where the aircraft is and where it is going.

In order to navigate safely, a pilot must know the overall situation including weather, position of other traffic, approach procedure at the destination and much more.

Although not all flights will make use of the navigational aids mentioned, nor, indeed, are they available in many of the airports, a draft outline of other navigational aids in the course of a hypothetical flight from one airport to another is set out hereunder:

FLIGHT PLANNING

The Air Regulations require that "prior to the commencement of any flight the pilot-in-command of an aircraft shall familiarize himself with all available information appropriate to the intended flight". The pilot must determine the proper route, altitude, alternate routes and altitudes, the amount of fuel, air speed, airport condition and so on in order to avoid unforeseen events.

One factor which alone can determine the future of the flight is the weather. Aviation weather is much more detailed than that given to the general public. The pilot needs to know the current weather for the point of departure, for the destination, for an alternate airport and for points along the route. He must know the forecast weather as well as any significant warnings (SIGMET) and reports from pilots flying ahead (PIREP). Other necessary information includes upper wind and temperature forecasts, area prognosis and specific details, such as the presence of icing and turbulence.

Aviation weather in Canada is the responsibility of the Atmospheric Environment Service (AES) of the Department of the Environment. There are 60 AES weather offices, 116 flight service stations and 125 weather stations. Not all of these operate 24 hours per day. Hourly weather reports (service actuals or SA) are taken at more than 300 locations in Canada. Area forecasts (FA) are prepared four times daily for 90 regions and terminal forecasts (FT) list the expected weather at 160 airports. There are 20 weather radars across Canada giving hourly reports (RAREPS). For an impression of the detail in an aviation weather report used by a pilot in flight planning, consider the following weather sequence as the pilot would receive it:

YWG RS1500 -XM7OVC 2V R-F 115/5/4/0410/006 F3ST7 VSBY1-3 214

These numbers mean that at Winnipeg (YWG) the observer made a special report of a significant weather change on the hour of 1500 Greenwich mean time (RS 1500) and observed a sky partially obscured (-X) with the overcast cloud height measured at 700 feet (M7OVC) above the ground. The visibility was varying around two miles (2V) in light rain and fog (R-F). The sea level pressure was 1011.5 millibars (115), the temperature 5° celsius, the dew point 4° celsius (5/4), the wind from the north east at 10 knots (0410), the altimeter setting 30.06 inches of mercury (006). The report adds that the fog covered 3/10's of the sky and stratus clouds covered 7/10's (F3ST7). The visibility varied from one to three miles and the barometric pressure had been rising steadily (214).

Hence one can easily see that the needs of aviation weather users are quite different from those of the general public who might be satisfied with the following interpretation of the above report: "At Winnipeg it was cloudy with light rain".

The amount of fuel to be carried is determined at the flight planning stage and depends on such factors as aircraft load, altitudes available, expected delays and so forth. All aircraft are required to carry a fuel reserve to be used only in an emergency. Factors that determine the legal reserve include type of aircraft (airplane/helicopter, turbine/piston) and type of flight (private/commercial transport, instrument/visual).

Flight planning is done in varying degrees of complexity depending upon the particular operation. At one extreme are the major airlines with their own weather briefing and computer dispatch centres while at the other extreme is the private pilot who telephones the local flight service station to receive weather information and Notices to Airmen (NOTAM) and files a plan, all in one phone call.

One of the principal reasons for filing a flight plan is to aid search and rescue (SAR). In Canada, two other terms are used in addition to "flight plan" and these are "flight notification" and "flight itinerary". All three list the type of aircraft, its registration, its colour, airspeed, radio equipment on board, proposed route, time of departure, arrival, amount of fuel carried, number of crew and passengers and other information that would aid in search and rescue. With a flight plan the search will begin if the aircraft is one hour overdue. In remote locations for example, when communications are not readily available, the flight notification and flight itinerary allow for longer periods

between the estimated time of arrival and the beginning of a search. Flight plans are also used to notify air traffic control of the proposed flight. Many regularly scheduled airline flights are routine, and since the details of the flight plan change little from day to day, the plans are "centre stored" with air traffic control. The flight plan is the script that guides aviation personnel in their respective roles.

AIRCRAFT TAXIING

After flight-planning, loading and pre-flight checking, the aircraft is ready to taxi to the runway for take-off. At a controlled airport the pilot must get clearance to taxi from the control tower, and at the largest airports a pilot may use several radio frequencies before being cleared for take-off. Pilots and controllers speak in standard phrases designed to reduce radio congestion and to eliminate misunderstandings. They use the international phonetic alphabet that replaces the 26 letters of the alphabet with 26 words beginning with the letter. Another method used to reduce radio congestion at the busiest airports is the provision of a discreet frequency with a recorded message of the latest airport information such as wind, direction and runway in use. This is termed automatic terminal information service (ATIS). All the different radio frequencies are published in documents carried on board the aircraft. At a large airport the pilot would listen to the ATIS then turn to the clearance delivery frequency to confirm the proposed routing by means of a "clearance" and then turn to another frequency to call ground control. At smaller controlled airports the initial radio contact would be with ground control. Receipt of a clearance is designed to see that the airspace along the route will be held clear in the event communications between pilot and controller are lost.

Other navigational aids used in the taxiing phase include taxiway lighting. At night, and in conditions of low visibility, taxiway edge lighting, centre lighting and holding position markings guide the pilot in the same manner that street lights and pavement markings guide a driver on a highway.

The foregoing is applicable to controlled airports in Canada. At all other airports there is no requirement for a pilot to be cleared to taxi. If a flight service specialist is present at the airport, he will advise the pilot of local conditions, but the aircraft can move whenever ready. Some airports have a private advisory called a UNICOM. At other

uncontrolled airports there may be no ground station at all. The pilot would then broadcast his intentions in the hope that aircraft in the vicinity would hear.

TAKE-OFF

When ready for take-off, the pilot changes from ground frequency to tower frequency.

Aircraft with no radio (NORDO) are allowed to operate at controlled airports with prior permission. A system of visual signals has been devised for communication between pilot and controller. The tower can flash green, red or white lights to send different messages. For example, a fláshing green light indicates cleared to taxi while a steady green light means cleared for take-off. A steady red light means stop. The aircraft acknowledges by movement of the controlled surfaces, or at night by flashing the landing light and by complying with the clearance or the instruction. An aircraft with a receiver only (RONLY) acknowledges in a similar manner.

All airports have a traffic procedure called a circuit. The circuit is a rectangular pattern, the four sides of which are:

1) a downwind leg paralleling the runway;
2) a base leg perpendicular to the runway;
3) final approach leg, the runway itself, and the departure path;
4) a crosswind leg perpendicular to the runway.

The purpose of the pattern is to organize the flow of traffic to avoid conflict. Aircraft normally fly a circuit at 1,000 feet above the ground, and unless special conditions dictate a right-hand turn, all turns are normally made to the left. From the label "downwind" one can see that the wind direction determines the direction of landing. When the pilot enters the pattern over the airport, he joins the downwind and follows the rectangular pattern into position to land facing the wind. When departing, the pilot follows the circuit or departs straight out until clear of circuit traffic.

Moments before the take-off, in a transponder equipped aircraft, the pilot turns on a transponder, a radio transmitter that sends out a coded signal to be read on a radar screen. One must distinguish between two types of radar: primary radar and secondary surveillance radar (SSR). The primary radar returns an echo from any reflecting object within range. The secondary surveillance radar, on the other hand, detects only those aircraft that send out the coded transponder signal. The SSR has greater range and has the advantage of assigning positive identification to each return on the radar screen. Many aircraft, however, do not have a transponder. With a special type of altimeter some aircraft are also equipped to transmit an altitude number along with the transponder signal (Mode C). In order for the controller to read the altitude of the aircraft on the screen, the radar equipment must have a special feature. This feature is included in the new Canadian radar system called the Joint Enroute Terminal Systems (JETS). At the time of the hearings, JETS were in operation at Moncton and Toronto only. The purpose of the altitude information is to aid in collision avoidance. Another use of SSR is the Terminal Radar Service Area (TRSA). This is a radar service to separate VFR traffic at busy airports such as Vancouver, Toronto and Montreal. Different types of radar have different ranges. The basic types of radar systems currently in use are: Airport and Airways Surveillance Radar (AASR-1), a medium range primary radar designed for surveillance to a range of up to 150 nautical miles, depending on altitude of the aircraft; Secondary Surveillance Radar with an effective range of up to 220 nautical miles and used for both enroute and terminal surveillance; Airport Surveillance Radars (ASR 3 and 5), short range primary radars with ranges to 60 nautical miles; and Airport Surveillance Radar 803, a medium range radar used to provide the air traffic controller with accurate altitude azimuth and range, used in precision approaches.

Contrary to the view of many laymen, aircraft flying in Canadian airspace are not constantly under radar surveillance. Particularly in northern Canada, there is neither primary nor secondary surveillance radar. Another popular misconception is that radar is used to guide the pilot to the threshold of the runway. Use of precision approach radar (PAR), favoured by the military, is rare at civilian airports.

The pilot today might receive radar traffic information such as the following from the controller: "Your traffic is at 12 o'clock 5 miles type and altitude unknown".

The controller's ground-based radar can also inform the pilot of heavy areas of precipitation and other severe weather. Many transport aircraft and some private aircraft carry their own airborne weather radar.

As noted above, on a national basis, 26% of accidents occur on take-off. The disaster at Tenerife amply demonstrated the need for caution in take-off clearances. Airline operations are presently conducted in very low visibility when neither the pilots nor the controllers can see that the runway is clear. A navigational aid designed to remedy this problem is a type of ground radar called Airport Surface Detection Equipment (ASDE). Toronto International is the only Canadian airport with ASDE. Other aids in the take-off phase include runway lighting and windsock lighting. Concerns that are related to navigational aids include special altitude and power restrictions for noise abatement and design requirement for navigational aid antennas so that they do not become hazards in the event of a rejected take-off.

CRUISE

During the cruising portion of a flight the pilot normally follows what is called an airway. This is a corridor along the line to or from a navigational aid, such as a VOR. Along these corridors aircraft fly at different altitudes depending on their direction of flight.

The airspace over Canada is also divided into special areas and zones. For example, northern domestic airspace is distinct from southern domestic airspace, high level airspace distinct from low level airspace and so on. There are many types of controlled airspace, including airways, control areas and terminal radar service areas. Where air traffic control is absent, the airspace is termed "uncontrolled". In uncontrolled airspace air traffic control has no authority over air traffic. Many different regulations apply to the different divisions. For example, in uncontrolled airspace visual flight rules (VFR) allow aircraft to fly 2,000 feet horizontally away from the nearest cloud, but in controlled airspace the VFR pilot must remain at least a mile from cloud.

The airspace is also divided into flight information regions (FIR). Each FIR is served by an area control centre (ACC) that provides a range of service from traffic control to

customs notification. Another airspace division mentioned in Volume 2 of this Report is special use airspace. There are also divisions called: altimeter setting region, standard pressure region, designated mountainous region, sparsely settled area and speed limit area.

An aircraft flying in controlled airspace under instrument flight rules will be separated from other such aircraft. Separation is the job of the air traffic controller who allows different types of aircraft to travel at different distances apart, depending on factors such as their location, size and speed. For example, a light aircraft will be separated farther behind a heavy aircraft than behind another light aircraft. With radar, the actual position of the aircraft is visible on the screen. Without radar, separation is accomplished procedurally, that is, by requiring the pilots to report their position at designated reporting points. In either case a "loss of separation" occurs when two aircraft come closer together than the separation standards allow. An aircraft flying on instrument flight rules (IFR) will be separated from other IFR traffic by the air traffic controller. However, aircraft flying according to visual flight rules may also fly along the airways and these aircraft separate themselves by the principle of "see and avoid". There is a provision within the "Block Airspace" for controlled VFR, that is, for aircraft to fly with visual reference to the ground, but also to receive controlled separation.

The enroute aircraft, in addition to navigating, also request the latest weather information, revise flight plans and so on. This is normally done through the flight service specialists (FSS) at the nearest flight service station. The FSS has many functions which will be discussed in relation to uncontrolled airports.

APPROACH AND LANDING

The highest number of accidents occur on approach and landing. During the approach the aircraft is descending, often into an area where many aircraft are arriving and departing.

An aircraft on instrument flight rules will be cleared to descend from its enroute altitude. The pilot will listen to the ATIS or will receive the latest information on ceiling visibility, wind, runway, altimeter setting, approach aid in use and airport condition directly from the controller. When the airspace around the approach aid, such as the ILS, VOR or the NDB, is available, the aircraft will receive a clearance.

The pilot has a chart or "approach plate" and follows a series of headings and altitudes that allow the aircraft to descend safely until visual contact with the runway is established. The ILS facility, of which there are fewer than 100 in Canada, was discussed in detail in Volume 2 of this Report. An advanced approach aid under development is the microwave landing system (MLS).

At a specified point outside of the control zone, the pilot approaching a controlled airport will contact the airport control tower. From this point on the arrival procedures for both VFR and IFR traffic are similar: the pilot must obtain clearance to enter the zone, although IFR aircraft will usually be "handed-off" whereas VFR traffic will be unannounced.

Prior to landing at a controlled airport, the aircraft must obtain landing clearance which is given on final approach.

After touchdown the aircraft moves clear of the runway and changes to ground control frequency to request clearance to the desired location on the airport.

Where NORDO are permitted, the pilot flies a standard circuit passing over the centre of the runway and joining the downwind leg midway between the ends of the runway. If the airport has a control tower, landing and taxi clearance may be given with the light signals previously mentioned.

At uncontrolled airports Transport Canada has designated a mandatory frequency (MF) to be used by all aircraft within a specified distance of the aerodrome. IFR arrivals are obligated to report at a number of points during the instrument approach and VFR arrivals report upon entering the mandatory frequency area, upon joining the circuit pattern and on final approach. The aircraft then reports when it is down and clear of the active runway.

Large transport aircraft may carry a ground proximity warning system (GPWS) that uses the radio altimeter to warn the crew if their closure rate with the ground is excessive. Another navigational aid for landing is the visual approach slope indicator system (VASIS). This is a series of lights on the ground at the runway threshold arranged to tell the pilot whether he is too high or too low to accomplish the landing successfully.

An IFR aircraft is always given a clearance limit beyond which it cannot go without further clearance. The limit is often the approach aid at the destination, but any enroute navaid can be used. If the airspace ahead is occupied, the air traffic controller may require the aircraft to remain within a protected airspace. Generally, the pilot flies to a designated position ("fix") over a navigational aid or intersection and follows a standard racetrack pattern: At the fix, the aircraft reverses course for a specified time or distance before returning to the fix. This is termed a "holding pattern". When the airspace ahead is clear, the aircraft is cleared to proceed beyond the fix.

Most airports in Canada have few navigational facilities and services. Even where a control tower is in operation, this does not necessarily mean other navigational aids will be available. For instance, the Toronto Island Airport is one of the busiest in Canada and yet has no instrument approach.

A SUMMARY LIST OF THE PRINCIPAL NAVIGATIONAL AIDS

Very High Frequency (VHF) transmitter and receiver
Ultra High Frequency (UHF) transmitter and receiver
High Frequency (HF) transmitter and receiver
Very High Frequency omni - Directional Range (VOR)
Low Frequency Non-Directional Beacon (NDB)
Distance Measuring Equipment (DME)
VHF Direction Finder (VDF)
Instrument Landing System (ILS)
Radar
Transponder
Lighting: Approach, Threshold, Runway, VASIS
Weather services
Flight Planning Services, Notices to Airmen (NOTAM)
Air Traffic Control Services
Search and Rescue (SAR)
Charts, Maps, Publications

The foregoing is not an exhaustive review or list of all the aids available, but merely serves as an introduction to the issues to be discussed.

The issues raised in this phase were many and varied. It is quite impossible for me to deal with all of them. I have selected what I regard to be the principal issues which have the most direct effect on aviation safety.

PART I

RELEVANT LEGISLATION

The responsibility of the Minister of Transport for the provision of air navigational facilities and services to ensure the safe and expeditious movement of aircraft is contained in Part I of the Aeronautics Act, Paragraph 6 (1), Sub-Paragraphs (c), (f) and (h) in which it is stated:

> "Subject to the approval of the Governor in Council, the Minister may make regulations to control and regulate air navigation over Canada, including the territorial sea of Canada and all waters on the landward side thereof, and the conditions under which aircraft registered in Canada may be operated over the high seas or any territory not within Canada, and, without restricting the generality of the foregoing, may make regulations with respect to
>
> (c) the licensing, inspection and regulation of all aerodromes and air-stations;
>
> (f) the prohibition of navigation of aircraft over such areas as may be prescribed, either at all times or at such times or on such occasions only as may be specified in the regulation, and either absolutely or subject to such exceptions or conditions as may be so specified;
>
> (h) aerial routes, their use and control;"

As a supplement to the responsibility of the Minister, as outlined in Part I of the Aeronautics Act, the Air Regulations in Part I, Paragraph 104, Sub-Paragraphs (e), (f), (i), (j) and (k) contain the following:

> "The Minister may make orders or directions prescribing standards for the supervision and control of aeronautics and conditions under which aircraft registered pursuant to these Regulations may be operated and, without restricting the generality of the foregoing, may make orders or directions prescribing standards and conditions
>
> (e) governing the conduct of visual and instrument flights;
>
> (f) for the establishment and operation of air traffic control, flight information and alerting services;
>
> (i) for the dissemination of meteorological information for aircraft operations;

(j) for a dimensional system for all air navigation and air traffic control purposes;

(k) for the standardization of communications equipment and systems and of communications procedures used in air navigation;"

PART II

CONTROLLED AIRPORTS

The Air Regulations define an airport as "an aerodrome for which under Part III of the Air Regulations an airport licence has been issued by Transport Canada". In turn, an aerodrome is defined as:

> "any area of land, water (including the frozen surface thereof) or other supporting surface used or designed, prepared, equipped or set apart for use either in whole or in part for the arrival or departure, movement or servicing of aircraft and includes any buildings, installations and equipment in connection therewith;"

There are literally several thousand aerodromes in Canada in normal everyday use. As was previously noted, as of January 1, 1980 only 1,111 aerodromes were licensed thereby qualifying them as airports.

According to the following schedule, of the licensed airports, 60 have control towers operated by Transport Canada with an additional three operating during the summer months only. In addition, the Department of National Defence operates 13 control towers which serve civil and military air traffic in control zones covering a 25 mile radius of the airport at which the tower is situated. The following is a list of the locations of control towers operated by Transport Canada and by the Department of National Defence.

Transport Canada Control Towers

Abbotsford, B.C.
Baie-Comeau, Quebec
Brandon, Manitoba
Buttonville, Ontario
Calgary International, Alberta
Castlegar, B.C.
Charlottetown, P.E.I.
Dorval International, Quebec
Edmonton Municipal, Alberta
Edmonton International, Alberta
Fort McMurray, Alberta
*Fort Nelson, B.C.
Fort St. John, B.C.
Fredericton, New Brunswick
Gander International, Nfld.
Goose, Nfld.
Grande Prairie, Alberta
Halifax International, Nova Scotia
Hamilton, Ontario
Kamloops, B.C.
Kelowna, B.C.
Langley, B.C.
Lethbridge, Alberta
London, Ontario
Mirabel International, Quebec
Moncton, New Brunswick
*Nanaimo, B.C.
North Bay, Ontario
Oshawa, Ontario
Ottawa International, Ontario
Penticton, B.C.
Pitt Meadows, B.C.
Prince George, B.C.
Quebec, Quebec
Red Deer Industrial, Alberta
Regina, Saskatchewan
Saint John, New Brunswick
St. Amdrews, Manitoba
St. Catharines, Ontario
St. Honore, Quebec
St. Hubert, Quebec
St. Jean, Quebec
St. John's, Nfld.
Saskatoon, Saskatchewan
Sault Ste. Marie, Ontario
Sept-Iles, Quebec
Springbank, Alberta
Sudbury, Ontario
Sydney, Nova Scotia
Thompson, Manitoba
Thunder Bay, Ontario
Toronto International, Ontario
Toronto Island, Ontario
Val D'Or, Quebec
Vancouver Harbour, B.C.
Vancouver International, B.C.
Victoria International, B.C.
Villeneuve, Alberta
Waterloo-Wellington, Ontario
Whitehorse, Y.T.
Windsor, Ontario
Winnipeg International, Manitoba
Yellowknife, N.W.T.

(* Summer Operations Only)

Department of National Defence Control Towers

Bagotville, Quebec
Chatham, New Brunswick
Cold Lake, Alberta
Comox, B.C.
Downsview, Ontario
Greenwood, Nova Scotia
Moose Jaw, Saskatchewan
Namao, Alberta
Petawawa, Ontario
Portage, Manitoba
Shearwater, Nova Scotia
Summerside, P.E.I.
Trenton, Ontario

For our purposes, an uncontrolled airport is one without a control tower, or an airport with a control tower when it is not in operation. Thus, some airports are controlled during the busy hours and uncontrolled during the quiet hours.

The difference from an operational standpoint between a controlled and uncontrolled airport is fundamental. At a controlled airport, a positive service is provided in which traffic is sequenced, and arriving and departing aircraft are separated and vehicular traffic is controlled. In the case of an uncontrolled airport there is no positive control, and, at the highest, an advisory service is provided if the airport is manned by a flight service station, and, at the least, no service whatsoever is provided.

The present cost for the construction of a control tower is said to amount from approximately $1,100,000.00 to $1,400,000.00. The direct operating cost per annum, excluding airport maintenance, was estimated at $200,000.00 for the smallest tower, increasing to approximately $800,000.00 for the largest tower.

The fundamental service of the air traffic controller is that of the separation of aircraft and the control of vehicular traffic. In doing so, the air traffic controllers employ two basic methods:

(a) Direct; performed through the use of radar and/or visual surveillance from control towers;

(b) Indirect Procedural Surveillance; performed through the receipt of aircraft position reports determined from the air navigation technique in use and transmitted via air-ground communications.

In the heavily populated southern regions of the country, air transport is principally dependent on air traffic control. Around major airports there is almost a total dependence on the use of radar. As I have already observed, two types of radar are used for surveillance. Primary radar displays targets by showing their direction and distance. Electromagnetic pulses are transmitted into space and receive energy reflected back from the target. Secondary surveillance radar transmits coded pulses which are received by a transponder on board an aircraft. The pulses are coded and if the result requires a

response, a reply pulse code is transmitted to the interrogating station which displays the reply. Secondary surveillance radar provides aircraft identification data, direction and distance. With the introduction of the Joint Enroute Terminal System (JETS) to be subsequently discussed, altitude and specific identification of the aircraft by display is added to the above information.

CRITERIA FOR THE ESTABLISHMENT OR DECOMMISSIONING OF CONTROL TOWERS

CATA policy with respect to the establishment or decommissioning of air traffic control towers is contained in the "CATA Objectives, Organization and Policy Manual, Volume III" set out hereunder.

"General

It is recognized that no criteria can be developed which will cover all possible traffic conditions. In some cases, towers may not be needed at locations which meet the criteria; conversely, it is conceivable that a tower may be necessary at a location not meeting the basic criteria. In the great majority of cases, however, it is felt that the basic criteria contained in this document should provide a valid basis on which to develop recommendations for changes in control tower service. Submissions for tower service may be made for towers which do not meet the criteria if such action is warranted.

Application

In the normal application of the criteria, a tower will: -

(a) Be opened when it meets the criteria.

(b) Be closed when it fails to meet the criteria.

Criteria

The criteria relate to a 12 month average of IFR and/or VFR movements during an 8 hour period.

Provide Service When

Average hourly rate over a 12 month period is:

(a) 12 aircraft movements upon representation from the users of the airport (96 per 8-hour shift; approximately 3,000 monthly)

(b) 8 aircraft movements if 1 is IFR
(64 per 8-hour shift, including 8 IFR; approximately 2,000 monthly)

(c) 4 aircraft movements if 2 are IFR
(32 per 8-hour shift, including 16 IFR; approximately 1,000 monthly).

Discontinue Service When

Average hourly rate over a 12 month period falls below: -

(a) 5 aircraft movements
(40 per 8-hour shift; approximately 1,200 monthly)

(b) 4 aircraft movements if 1 is IFR
(32 per 8-hour shift, including 8 IFR; approximately 1,000 monthly)

(c) 3 aircraft movements if 2 are IFR
(24 per 8-hour shift, including 16 IFR; 744 monthly).

Provision of Permanent Control Towers

Permanent towers will be located where there is a continuing requirement for airport traffic control service. They will be of standard design as approved by ATC Headquarters, Telecommunication and the Construction Branches.

Provision of Transportable Control Towers

Transportable towers will be provided at locations where lengthy but non-continuing air traffic control service is required pending the construction of a permanent tower.

Provision of Mobile Control Towers

Each Region will be provided with one or more Mobile Control Towers, the design of which is approved by ATC Headquarters. On occasions when mobility and dispatch are of prime importance and no other air traffic control facilities are available, Mobile control towers, which are self-sufficient, can serve a limited temporary need; e.g. - Air Shows, Civil Emergencies, or emergency repairs to Control Towers."

CLOSING OF CONTROL TOWERS AND TERMINALS DURING NON-PEAK HOURS

In 1976, in an attempt to reduce costs, the Administration studied the feasibility of closing control towers and terminal control units during the "silent hours". These are the hours between midnight and 8:00 a.m. (or 2:00 a.m. to 8:00 a.m. depending on the particular terminal or tower) when there is less traffic than in daylight hours.

The study was conducted by a team called "The Expenditure Curtailment Study Team". In May 1977 the Study Team recommended:

"1) Reducing operations during the silent hours at 15 Transport Canada airports having 24 hour air traffic control towers;

2) Reducing by one the supervisory coverage at Area Control Centres during the midnight shift; and

3) Combining the Area Control Centre/Terminal Control Unit operations during the hours of 0001-0600 lcl. The Terminal Units affected by this recommendation were Thunder Bay, Regina, Saskatoon, Quebec and Ottawa."

The Study Team was of the view that the criteria used to establish or decommission a control tower were, as set out above, "badly out of date and should be rewritten". In addition, they noted that the criteria were intended for the opening or closing of the entire control tower without provision for changing the hours of operation.

Nevertheless, as an interim measure, the Study Team recommended application of the criteria pending revision because "it provided the only criteria in Transport Canada with any possible applicability to the tower-manning problem".

The 15 towers slated to be closed at night pursuant to the recommendations of the Study Team were St. John's, Gander, Halifax, Moncton, Quebec City, St. Hubert, Dorval, Mirabel, Ottawa, Toronto, Winnipeg, Edmonton, Calgary, Vancouver and Victoria. After this initial submission the Administrator proposed that the number be reduced from 15 to 8. The towers affected by his proposal were Dorval, Quebec City, Ottawa, Edmonton, Halifax, Moncton, St. John's and St. Hubert. The towers at Quebec City and St. Hubert thereupon were closed during the night hours.

There was considerable concern expressed by those affected in the respective communities over the proposed closures. With respect to the Halifax tower, the objecting parties included the Provincial Government, City of Halifax Airport Advisory Committee, CATCA, ATAC and CALPA, and they expressed the following concerns:

"Closing would have a serious effect on present and future traffic growth.

CAT II approaches would not be available.

Airport would be less effective in providing service to the community.

Savings will be marginal.

Reduction of the level of service would be considered a reduction in the level of safety - this position would be taken publicly.

The standard of safety is not maintained by reducing the hours of operation for the control tower.

The cost benefits realized by TC are outweighed by the additional cost that would be added to the air carrier operations i.e. additional fuel uplift to carry alternate airport where positive control services are provided."

The Air Administration responded to such concerns as follows:

"Safety will not be reduced below an acceptable standard.

Airport control service will continue to be available on an 'as required' basis i.e. military exercises, high charter activity or adverse weather conditions.

There will be no change in the level of service now being provided for aircraft operating under instrument flight rules.

Airport control service during these 'designated' hours will be replaced by airport advisory service which will be provided by Aeradio."

In response to similar complaints with respect to each of the other proposed closures, the Air Administration wrote:

"1) Safety would not be reduced below an acceptable level as the criteria specified in Policy CA 201 would be met in all cases and airport control services would be available during those periods when the minimum aircraft movements (VFR and IFR) were recorded.

2) There would be no change in the level of service provided to aircraft operating under instrument flight rules.

3) Flight Service Specialists would provide airport advisory service at these airports during these designated hours.

4) Airport control service would continue to be available on short notice and as required to meet traffic demands. This would include traffic situations created by seasonal, charter activity, adverse weather activity and military missions.

As a subsequent note, at those airports where the hours of control tower operation were reduced, there have been no operating irregularities or

> accidents in which the degree or type of control service provided was considered a contributing factor."

In December 1978 the Minister directed the Department to delay indefinitely the night time closure of additional control towers. In its brief to the Commission, the Air Administration stated "In the absence of further Ministerial direction on this matter, the program continues to be held in abeyance".

In opposing the proposed reduction of services, the Canadian Air Traffic Control Association, Inc. submitted:

> ". . . First, with no controllers in the terminal control units during the midnight shift or 'silent hours,' there is no radar navigation or weather information service available to pilots. They are therefore deprived of that type of service in the event that it is required. Secondly, separation between aircraft must be based on time, distance, speed, and altitude computations rather than on radar separation. The separation required under that system is approximately ten times that required under a radar condition, therefore the service is less efficient. This also presents a problem in the event that the pilot has to change altitude enroute due to weather or an emergency. The controller may not be able to accommodate the request because of other traffic in the same area.
>
> Additionally, incidents can occur which create hazardous situations that could lead to catastrophic results. For example, on October 31, 1979, a Boeing 727 slid off the runway while landing at Winnipeg International Airport. Weather was severe at the time as a result of snow and all runways at Winnipeg were closed. Six aircraft which were on approach following the 727 were forced to divert to another airport. As the time of the occurrence was twelve minutes prior to the scheduled closings at Regina, Saskatoon and Thunder Bay, the Winnipeg supervisor was able to ensure that Regina terminal stayed on duty until all aircraft were able to safely divert and land at Regina. Had Regina Terminal Control Unit been closed (which would have been the case twelve minutes later), there would have been no radar service either side of Winnipeg for approximately 500 miles. If the same aircraft had been forced to divert to Regina under those conditions, standard separation would have had to be used for approach separation. Instead of landing within approximately two to three minutes of each other as was the case, the aircraft would have been twenty minutes apart. The last aircraft would have had to hold for over two hours once he had reached Regina. In all likelihood one or more of these flights would have been in a critical fuel situation by that time."
>
> (Emphasis added.)

Mr. Alan M. Baxter, Standards Officer in the Operations and Liaison Division of Air Traffic Services, testified:

> ". . . There is definitely some truth in the matter that there might have been some delays on approach but I don't know that they could have been substantial enough to cause airlines to worry. I presume airlines carry enough fuel to get them from their point of landing to the alternate airport plus a certain amount extra. And this, certainly, if it is in terms of forty-five minutes, with six aircraft, there would not, I don't believe, be a delay of forty-five minutes at that alternate airport."

The Canadian Air Line Pilots Association expressed its disagreement with the proposed closures in a letter dated August 23, 1978 from Mr. Kenneth A. Maley to Mr. George C. Capern of ATAC:

> "I am appalled that the regulatory body would even suggest such a reduction and a reversion to aeradio operations so soon after the Cranbrook disaster, and prior to the release of the Cranbrook accident report. That they would even presume to equate positive Air Traffic Control with services provided by an aeradio operator indicates to me an incredible lack of appreciation of our operational requirements. To suggest a justification for such a reduction on the basis of less than a million dollars only compounds my original impression."
> (Emphasis added.)

The Air Transport Association of Canada addressed the proposed closures on two levels: safety and cost benefit. Mr. Capern of ATAC wrote:

> "After discussion and review, a decision has been reached that ATAC cannot support the proposal to replace Air Traffic Controllers with Aeradio Operators during 'silent hours', unless the latter were to occupy control tower positions and be capable of providing for all aspects of the duties performed by Controllers. In our opinion, to do otherwise would create a potential for erosion of the safety standards, notwithstanding the professional capabilities of the related personnel.
>
> Similarly, we cannot accept the rationale that advisory services should be viewed as sufficient during the 'silent hours'. Regardless of the operating period, human lives remain the constant, both in the air and on the ground. To suggest standards can be relaxed through changes proposed, regardless of the number of movements or related passengers is, in our considered opinion, unacceptable."
> (Emphasis added.)

He then provided figures to suggest that the saving of $1 million in the Department's proposal would result in substantial additional costs to the carriers for items, such as the necessity to board additional fuel.

Mr. Jim M. Livingston of CATCA also questioned the costs when he said:

> ". . . The cost benefit figures show or do not make any allowance for the fact that an additional controller was required in Winnipeg to offset the effect of three controllers not being present at Thunder Bay, Regina and Saskatoon."

The Canadian Owners and Pilots Association submitted the following comment in its brief:

> "COPA agrees with Transport Canada that certain Control Towers may be shut down in the late evening and not re-opened until early morning while still maintaining an acceptable level of air safety. <u>However, this is only acceptable if another aviation facility, such as a Flight Service Station, is available to communicate about air traffic conditions at the pertinent airport</u>. This FSS should have access to the control of runway light intensity, and be able to describe wind conditions, runway in use and braking action, etc. In Ottawa for instance, if the Control Tower were to be closed after midnight, pilots intending to land would establish contact with the Flight Service Station and receive the air information they would have received if the tower was still open and operational.
>
> COPA is also mindful of the fact that throughout Canada there are hundreds of small community and private airstrips which are licensed for night flying but not served with any kind of communication service. Pilots have the training and resourcefulness needed to cope with night operations in spite of established communication stations not being available. . . ."
> (Emphasis added.)

However, Mr. Russell J. Beach, President of COPA, added:

> "I've gone out of Malton real early in the morning and got my clearance, my ground control, my take-off and I guess even departure all by the same voice, so I'm sure that the staff must be at a minimum in those hours even at the present time. So, I doubt if there'd be very much saving."

Prior to the Minister's direction in December 1978, the original program was modified as a result of studies by ATC and consultation with interested parties. It was implemented as follows:

"I. Control Tower Operation
(Reduced to 18 hour operation)
Quebec City Tower
(Reduced to 16 hour operation)
St. Hubert

II. Area Control Centres (ACC)

Toronto	-	reduced by one supervisor
Winnipeg	-	reduced by one supervisor
Edmonton	-	reduced by one supervisor
Vancouver	-	reduced by one supervisor

III. Terminal Control Units (TCU)

Thunder Bay	-	close during 0001-0600
Regina	-	close during 0001-0600
Saskatoon	-	close during 0001-0600
Ottawa	-	close during 0001-0600"

On May 23, 1980 the Terminal Control Unit at Ottawa was reopened at the request of the Montreal Area Control Unit which had assumed control during the midnight shift. The request was made because of traffic problems in Montreal. The reduction of one supervisor at Toronto was also discontinued. Mr. Alan M. Baxter, Standards Officer in the Operation and Liaison Division of the Air Traffic Services Branch, who was the principal witness on behalf of Transport Canada on this issue, testified that the original program which contemplated reducing operations during the quiet hours at 15 Transport Canada airports had been shelved and that there was no intent to carry it on. The Administration however was of a different view. The following exchange occurred during the examination of Mr. Baxter:

> "MR. COMMISSIONER: To meet Mr. Livingstone's question, what is the proposal now? Will it still be 14 instead of 15?
>
> THE WITNESS: Well, actually the program has been shelved and there is, to my knowledge, there is no intent at the present time to carry this. This specific project has been curtailed and until further direction is received from the Minister there are no plans.
>
> MR. SOPINKA: We might shorten this matter, Mr. Commissioner, if we are going to have all these witnesses on this subject we may be tilting at windmills.
>
> MR. COMMISSIONER: That's what I was wondering.

MR. SOPINKA: I wonder if we could have Mr. Garneau, at some stage, tell us whether or not they acknowledge that this program should not continue, and then we can deal with Quebec City. Because that's the only one, St. Hubert apparently nobody has objected to.

MR. GARNEAU: I think Mr. McLeish could make a statement on that at this point, Mr. Sopinka.

MR. COMMISSIONER: Just to clarify the matter that was brought up by Mr. Livingstone and the brief is a little ambiguous in that respect.

MR. McLEISH: The motivation for this in the first place was the pressure from the Air Administration to find ways to cut costs.

The Air Administration is still in that position. They are under considerable pressure at this time to find ways to cut costs. And the Air Administration will be obliged to recommend once again that towers where there is so little traffic at certain hours a day that we will so recommend to the Minister that this program be re-examined."
(Emphasis added.)

COMMENT

No one suggested that it was at all feasible to establish control towers at every airport. The air traffic controllers did submit, however, that a control tower should be established at every airport where a commercial air carrier operates a scheduled passenger service. This submission was given impetus by the tragic accident at Cranbrook, British Columbia, an uncontrolled airport, where Pacific Western Airlines operates a scheduled passenger service utilizing a Boeing 737. There are, indeed, many uncontrolled airports in Canada at which commercial air carriers operate a scheduled passenger service.

In its brief the Canadian Air Line Pilots Association summarized the present situation as follows:

> "It is historically true that the 'airside' of aviation outstrips the 'groundside'. This is the case in Canada, where many airports used regularly by jet transport aircraft are deficient in facilities (for example, of the 116 airports CALPA members operate into only 18 have 24-hour control towers, while a further 30 have part-time towers, leaving 68 without control). Unless a concerted effort is made the gulf between airside and groundside capabilities will continue to widen as new generation aircraft come into service over the next several years."
> (Emphasis added.)

However, such commercial air carrier services often operate at airports where there is very little traffic.

Since the principal service provided by a control tower is that of separating traffic, it follows that traffic must be the dominant consideration in determining whether control towers should be established. It does not follow, therefore, that it would be economically feasible or purposeful to establish a control tower merely because of a scheduled passenger service arriving and departing at an airport.

The CATA policy with respect to the establishment or decommissioning of control towers uses traffic as the major criterion. However, as has been noted, it was the opinion of the Study Team referred to above that the criteria presently used by CATA were "badly out of date and should be rewritten".

Mr. Jim M. Livingston, an air traffic controller and a former president of CATCA, whose views are not in every respect ad idem with official CATCA policy, submitted a thoughtful and constructive brief on the considerations which should be given to the commissioning of control towers as well as the services which should be provided at uncontrolled towers, a subject matter which will be subsequently referred to.

I set out hereunder Appendix "A" to Mr. Livingston's brief which includes the number of aircraft movements at 172 uncontrolled airports in Canada. An examination of the figures in Appendix "A" reveals that the total number of movements at these airports in 1979 ranges from 144,280 at Maple, Ontario, to 47 at Grise Fiord, NWT:

APPENDIX "A"

ANNUAL 1979 ANNUEL

TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS		CIVILS	MIL.	TOTAL
				CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.			
AKLAVIK, N.W.T./T.N.-O.	*1979	2,239	2,211	176	1,684	240	-	-	2	61	48	28	-	28
AMOS, QUE.	1979	7,504	2,063	7	1,372	624	-	7	2	51	-	5,441	-	5,441
	1978	10,536	2,070	46	1,305	651	-	15	7	44	2	8,466	-	8,466
	1977	1,548	762	3	446	294	-	2	3	14	-	786	-	786
	1976	3,580	1,096	5	855	234	-	-	-	2	-	2,484	-	2,484
	1975	17,627	4,198	8	3,512	669	-	2	2	5	-	13,429	-	13,429
ATIKOKAN, ONT.	1979	15,239	3,363	2,067	653	591	-	1	9	42	-	11,876	-	11,876
	1978	8,205	3,053	2,014	320	677	-	1	11	30	-	5,152	-	5,152
	1977	14,248	3,026	2,028	233	729	2	1	17	13	3	11,222	-	11,222
	1976	7,294	2,040	1,617	124	262	1	-	16	18	2	5,254	-	5,254
	*1975	291	254	234	5	10	-	-	4	1	-	37	-	37
BAKER LAKE, N.W.T./T.N.-O.	1979	4,268	4,268	1,622	2,317	157	-	2	-	83	87	-	-	-
	1978	4,833	4,627	1,569	1,920	480	1	1	1	513	142	198	8	206
	1977	1,868	1,694	700	766	117	4	-	-	84	23	174	-	174
	1976	5,288	4,296	2,152	1,581	423	-	6	-	94	40	992	-	992
	1975	2,118	1,939	1,175	401	249	-	-	-	64	50	177	2	179
BATHURST, N.B.	1979	6,580	2,742	614	1,493	573	1	9	10	23	19	3,829	9	3,838
	*1978	1,211	371	38	272	51	-	1	1	4	4	840	-	840
BERENS RIVER, MAN.	*1979	2,453	2,434	1,442	574	201	-	-	-	217	-	19	-	19
BLANC SABLON, QUE.	1979	3,996	2,052	804	1,130	90	-	-	-	28	-	1,944	-	1,944
	1978	4,891	2,462	1,072	1,280	88	-	-	-	22	-	2,429	-	2,429
	1977	5,074	2,594	935	1,095	555	-	-	-	9	-	2,480	-	2,480
	1976	4,153	2,212	1,101	422	668	-	-	-	21	-	1,941	-	1,941
	1975	2,224	2,218	1,725	144	331	2	-	-	16	-	6	-	6
BLOODVEIN RIVER, MAN.	*1979	710	692	-	620	20	-	-	-	52	-	18	-	18
BRANTFORD, ONT.	1979	22,407	1,951	26	1,181	649	-	55	21	19	-	20,456	-	20,456
	1978	20,551	2,148	25	1,122	915	1	22	36	25	2	18,403	-	18,403
	1977	19,747	1,924	23	905	858	-	60	68	8	2	17,822	1	17,823
	1976	19,259	2,153	37	961	1,055	1	23	59	17	-	17,106	-	17,106
	1975	18,492	1,951	35	895	900	2	24	76	19	-	16,541	-	16,541
BROCHET, MAN.	*1979	2,646	2,646	929	1,616	15	-	-	-	86	-	-	-	-
BROCKVILLE, ONT.	1979	11,958	1,718	153	736	686	-	42	57	42	2	10,240	-	10,240
	1978	7,650	1,316	35	501	704	-	7	17	38	14	6,334	-	6,334
	1977	9,041	914	42	377	435	-	2	32	24	2	8,127	-	8,127
	*1976	6,648	796	47	276	403	1	2	48	17	2	5,852	-	5,852
BROMONT, QUE.	1979	41,377	6,737	52	3,397	2,924	-	23	206	79	56	34,594	46	34,640
	1978	49,559	8,205	62	3,898	3,439	15	31	449	123	188	41,140	214	41,354
	1977	58,497	8,627	218	3,784	4,132	1	34	278	61	119	49,778	92	49,870
	1976	45,689	8,362	284	4,374	3,081	7	29	185	132	270	37,070	257	37,327
	1975	58,108	11,305	144	6,678	4,089	-	12	131	85	166	46,190	613	46,803
BURWASH, Y.T./T.Y.	1979	1,368	1,188	54	532	357	-	4	219	14	8	180	-	180
	1978	1,183	1,007	10	276	387	1	3	281	8	41	176	-	176
	1977	1,422	1,059	5	256	432	-	6	340	7	13	363	-	363
	1976	1,610	1,205	17	269	545	-	6	352	4	12	405	-	405
	1975	2,185	1,237	20	252	591	-	2	355	8	9	946	2	948
CAMBRIDGE BAY, N.W.T./T.N.-O.	1979	3,016	2,821	2,208	330	130	5	1	1	70	76	195	-	195
	1978	4,972	3,183	2,457	361	152	3	8	-	86	116	1,783	6	1,789
	1977	3,323	2,952	2,210	370	165	2	-	-	89	116	360	11	371
	1976	3,228	3,097	2,310	360	252	3	2	-	58	112	128	3	131
	1975	3,213	2,628	2,031	195	212	6	4	1	84	95	572	13	585
CAMPBELL RIVER, B.C./C.B.	1979	23,516	13,711	2,939	3,710	5,819	7	25	947	251	13	9,785	20	9,805
	1978	27,584	6,989	1,781	1,472	3,232	56	7	279	154	8	20,593	2	20,595
	1977	36,216	8,855	3,160	2,505	2,716	7	9	268	190	-	27,361	-	27,361
	1976	10,795	7,481	2,478	1,496	3,001	2	4	334	164	2	3,306	8	3,314
	1975	8,104	7,392	2,594	1,270	3,185	1	3	206	129	4	706	6	712
CAPE DORSET, N.W.T./T.N.-O.	*1979	330	330	237	13	22	22	4	-	20	12	-	-	-

* An asterisk denotes that the station participated in the survey for the first time or after an absence of a year or more.

APPENDIX "A" CONTINUED

ANNUAL 1979 ANNUEL

TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC / INTÉRIEURS			INTERNATIONAL / INTERNATIONAUX			GOVERNMENT / OFFICIELS		CIVILS	MIL.	TOTAL
				CARRIERS / TRANSPORT	OTHER COMM. / AUTRES COMM.	PRIV.	CARRIERS / TRANSPORT	OTHER COMM. / AUTRES COMM.	PRIV.	CIV.	MIL.			
CARP, ONT.	1979	23,749	851	29	651	160	-	7	-	4	-	22,898	-	22,898
	1978	12,218	200	-	192	4	-	4	-	-	-	12,016	2	12,018
	1977	49,581	1,637	720	691	190	2	9	7	18	-	47,932	12	47,944
	1976	54,520	2,322	1,468	388	398	9	1	7	5	46	52,016	182	52,198
	1975	7,808	110	6	44	57	-	-	-	-	3	7,605	93	7,698
CEDARS, QUE.	1979	138,851	658	12	224	408	-	1	9	-	4	138,193	-	138,193
	1978	108,983	221	4	77	135	-	-	3	2	-	108,762	-	108,762
	1977	109,364	582	5	198	372	-	-	5	2	-	108,782	-	108,782
	1976	112,061	717	30	249	423	2	3	7	-	3	111,344	-	111,344
	1975	97,061	610	14	189	396	1	2	6	-	2	96,440	11	96,451
CHAPLEAU, ONT.	1979	3,245	2,247	1,707	147	335	-	3	14	39	2	998	-	998
	1978	4,051	2,435	1,808	176	399	1	-	16	29	6	1,616	-	1,616
	1977	2,802	1,321	834	224	230	2	-	9	16	6	1,463	18	1,481
	1976	2,228	1,112	926	40	140	2	-	4	-	-	1,116	-	1,116
	*1975	380	151	81	19	49	-	-	-	2	-	229	-	229
CHARLEVOIX, QUE.	1979	2,378	955	12	482	328	1	-	6	126	-	1,423	-	1,423
	1978	1,344	800	34	320	358	-	1	6	61	20	544	-	544
	1977	1,422	748	62	323	293	-	2	16	48	4	674	-	674
	*1976	2,207	723	66	271	300	-	2	9	41	34	1,469	15	1,484
CHARLO, N.B.	1979	5,211	4,113	1,579	967	1,065	3	5	203	239	52	1,096	2	1,098
	1978	6,538	5,161	2,446	987	1,278	-	3	205	186	56	1,366	11	1,377
	1977	7,836	6,208	2,012	2,270	1,497	2	7	191	158	71	1,599	29	1,628
	1976	21,190	3,756	919	1,403	1,096	2	4	138	152	42	17,423	11	17,434
	1975	7,471	2,695	1,232	645	578	-	2	114	108	16	4,760	16	4,776
CHEVERY, QUE.	1979	2,412	1,211	1,063	138	6	-	-	-	4	-	1,201	-	1,201
	1978	2,997	1,531	1,332	169	23	2	-	3	2	-	1,466	-	1,466
	1977	2,362	1,187	1,107	60	18	-	-	1	1	-	1,175	-	1,175
	1976	2,601	1,375	1,249	76	43	1	-	2	4	-	1,226	-	1,226
	1975	2,007	1,083	1,055	17	5	6	-	-	-	-	922	2	924
CHIBOUGAMAU, QUE.	1979	3,015	2,887	788	1,445	538	6	6	4	96	4	128	-	128
	1978	3,773	3,233	1,015	1,770	311	5	9	10	83	30	540	-	540
	1977	3,485	2,490	1,221	664	426	6	14	19	127	13	995	-	995
	1976	3,528	2,093	1,117	496	303	3	23	31	100	20	1,435	-	1,435
	1975	6,685	3,148	1,447	893	534	4	27	14	222	7	3,537	-	3,537
CHURCHILL FALLS, NFLD./T.-N.	1979	3,303	2,934	678	1,512	679	-	1	1	47	16	369	-	369
	1978	3,640	3,317	892	1,942	416	-	2	4	47	14	320	3	323
	1977	7,878	3,466	915	2,194	312	2	3	-	27	13	4,408	4	4,412
	1976	4,296	3,698	902	2,399	326	-	-	2	69	-	598	-	598
	1975	4,486	3,774	1,637	593	1,484	1	-	3	48	8	712	-	712
CHURCHILL, MAN.	1979	6,781	6,237	4,773	460	560	18	5	18	198	205	542	2	544
	1978	8,965	8,301	6,059	680	1,024	25	5	16	286	206	655	9	664
	1977	9,105	7,635	4,880	932	1,037	9	2	13	415	347	1,328	142	1,470
	1976	9,799	8,481	5,472	709	1,636	23	2	16	396	227	1,215	103	1,318
	1975	8,169	7,976	5,413	565	1,114	9	1	12	263	599	163	30	193
CLYDE RIVER, N.W.T./T.N.-O.	*1979	630	629	450	48	76	1	2	-	40	12	1	-	1
COLLINGWOOD, ONT.	1979	46,130	1,870	34	250	1,558	-	-	3	9	16	44,260	-	44,260
	1978	49,094	1,992	30	357	1,577	-	-	5	14	9	47,098	4	47,102
	1977	37,723	1,757	46	336	1,299	-	9	52	6	9	35,966	-	35,966
	1976	48,956	1,695	58	339	1,227	2	18	41	7	3	47,261	-	47,261
	1975	49,505	2,917	42	702	2,113	1	1	40	16	2	46,588	-	46,588
COPPERMINE, N.W.T./T.N.-O.	1979	2,026	1,916	1,140	554	140	1	-	1	65	15	110	-	110
	1978	2,397	2,267	1,460	570	141	1	-	2	75	18	130	-	130
	1977	2,161	1,951	1,139	388	323	2	1	-	42	56	176	34	210
	*1976	844	833	548	134	117	2	-	-	30	2	11	-	11
CORAL HARBOUR, N.W.T./T.N.-O.	1979	1,127	1,090	602	110	112	1	-	-	70	195	15	22	37
	1978	985	981	455	178	175	3	-	-	113	57	4	-	4
	1977	913	903	570	76	77	1	-	2	105	72	10	-	10
	1976	836	786	493	61	104	-	-	-	98	30	50	-	50
	1975	1,800	1,650	670	56	113	-	-	-	87	724	72	78	150

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TABLE 8 AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION TABLE 8

TABLEAU 8 MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS		CIVILS	MIL.	TOTAL
				CAR-RIERS TRANS-PORT.	OTHER COMM. AUTRES COMM.	PRIV.	CAR-RIERS TRANS-PORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.			
CRANBROOK, B.C./C.B.	1979	34,512	10,411	3,319	2,423	3,762	5	65	432	316	89	24,081	20	24,101
	1978	26,572	10,544	4,230	1,805	3,672	7	59	388	316	67	16,028	-	16,028
	1977	26,775	9,654	3,594	2,071	3,091	6	58	464	255	115	17,117	4	17,121
	1976	23,610	9,207	3,685	1,626	3,058	13	121	402	220	82	14,397	6	14,403
	1975	19,176	8,125	3,517	1,412	2,431	2	78	319	286	80	11,049	2	11,051
CROSS LAKE, MAN.	*1979	3,540	3,522	2,522	784	6	-	-	-	210	-	18	-	18
DAUPHIN, MAN.	1979	18,342	6,852	1,942	2,732	1,928	-	5	66	90	89	11,436	54	11,490
	1978	28,489	6,485	494	2,955	2,670	-	11	87	139	129	21,816	188	22,004
	1977	30,852	6,179	154	2,618	2,993	2	24	87	205	96	24,653	20	24,673
	1976	36,330	6,212	19	1,967	3,768	-	2	81	325	50	30,112	6	30,118
	1975	32,604	5,624	51	2,021	2,862	-	4	60	438	188	26,980	-	26,980
DAWSON CREEK, B.C./C.B.	1979	22,173	16,361	4,450	4,290	7,385	-	3	16	183	34	5,812	-	5,812
	1978	15,691	12,949	3,876	2,763	5,972	8	12	43	244	31	2,742	-	2,742
	1977	16,329	7,562	1,683	1,380	4,225	-	1	64	189	20	8,767	-	8,767
	1976	12,488	6,122	1,326	1,401	3,169	-	1	19	181	25	6,364	2	6,366
	1975	11,928	5,191	1,312	890	2,810	1	1	61	105	11	6,737	-	6,737
DAWSON, Y.T./T.Y.	1979	7,347	5,433	972	2,564	1,351	-	23	398	121	4	1,914	-	1,914
	1978	7,161	5,215	707	2,907	1,027	5	34	379	133	23	1,945	1	1,946
	1977	6,616	3,750	753	1,684	772	5	16	331	108	81	2,866	-	2,866
	1976	2,837	2,119	743	583	363	2	8	283	102	35	716	2	718
	1975	3,920	3,347	740	1,720	641	1	6	130	89	20	573	-	573
DEER LAKE, NFLD./T.-N.	1979	9,591	7,952	3,700	2,620	1,053	27	147	96	266	43	1,636	3	1,639
	1978	10,028	8,479	3,779	2,703	1,236	20	208	105	341	87	1,532	17	1,549
	1977	9,237	7,180	3,946	1,532	1,127	9	8	106	342	110	2,022	35	2,057
	1976	9,026	7,782	4,731	1,198	1,367	2	-	72	401	11	1,240	4	1,244
	1975	8,518	8,477	5,301	1,025	1,620	3	-	40	454	34	41	-	41
DRUMMONDVILLE, QUE.	1979	14,849	4,546	31	1,974	2,465	-	2	40	28	6	10,303	-	10,303
	1978	13,008	5,533	28	2,279	3,147	-	3	50	24	2	7,475	-	7,475
	1977	9,480	4,405	26	1,985	2,336	-	12	24	18	4	5,071	4	5,075
	1976	9,807	2,832	30	1,147	1,604	-	1	40	4	6	6,916	59	6,975
	1975	2,146	252	2	137	106	-	1	2	4	-	1,870	24	1,894
DRYDEN, ONT.	1979	17,898	8,539	5,691	1,135	1,133	9	21	193	243	114	9,239	120	9,359
	1978	21,009	8,181	5,295	1,341	1,151	2	6	191	158	37	12,818	10	12,828
	1977	13,913	8,659	5,770	1,213	1,230	11	8	214	177	36	5,250	4	5,254
	1976	12,971	8,468	5,801	927	1,308	7	6	151	218	50	4,503	-	4,503
	1975	11,647	7,235	4,653	1,077	1,060	12	2	137	244	50	4,382	30	4,412
EARLTON, ONT.	1979	10,133	6,201	2,006	2,690	1,295	-	-	31	68	111	3,930	2	3,932
	1978	21,829	5,943	2,366	1,964	1,188	2	2	35	155	231	15,131	755	15,886
	1977	27,100	4,714	2,376	1,143	970	1	8	24	90	102	21,674	712	22,386
	1976	23,431	5,443	2,826	1,346	1,075	2	7	42	58	87	17,669	319	17,988
	1975	32,472	5,360	2,919	896	1,405	-	3	25	55	57	27,094	18	27,112
ELLIOT LAKE, ONT.	1979	7,634	6,291	4,442	777	1,007	-	-	20	43	2	1,343	-	1,343
	1978	7,280	5,486	3,737	666	999	-	4	25	48	7	1,794	-	1,794
	1977	4,357	3,246	2,095	479	613	1	1	9	45	3	1,111	-	1,111
	*1976	2,492	1,832	1,159	221	420	2	1	10	17	2	657	3	660
ESKIMO POINT, N.W.T./T.N.-O.	*1979	696	671	524	73	53	2	-	-	15	4	23	2	25
FLIN FLON, MAN.	1979	6,083	4,455	2,124	786	1,109	11	3	79	310	33	1,628	-	1,628
	1978	4,623	3,855	1,714	554	1,206	8	7	69	285	12	768	-	768
	1977	3,893	3,370	1,380	329	1,262	7	-	68	299	25	516	7	523
	1976	7,023	3,721	1,365	772	1,243	4	6	57	243	31	3,302	-	3,302
	1975	3,856	3,305	1,723	363	860	4	-	60	244	51	551	-	551
FOOTNER LAKE, ALTA.	1979	11,839	10,638	678	7,033	2,621	-	12	6	260	28	1,201	-	1,201
	1978	15,674	10,545	803	6,553	2,657	-	19	14	414	85	5,129	-	5,129
	1977	9,878	8,733	695	5,009	2,468	2	6	-	524	29	1,145	-	1,145
	1976	8,474	7,655	770	4,108	2,310	1	6	6	444	10	819	-	819
	1975	7,287	7,188	790	4,153	1,864	-	5	1	355	20	99	-	99
FORT CHIMO, QUE.	1979	6,327	5,215	1,191	3,224	345	16	133	32	239	35	1,111	1	1,112
	1978	6,230	6,228	1,482	3,760	480	24	110	32	270	70	2	-	2
	1977	5,467	5,464	1,111	3,222	718	20	100	24	220	49	3	-	3
	1976	5,407	4,671	1,901	1,306	1,185	19	14	31	145	70	736	-	736
	1975	3,979	2,957	2,066	442	306	6	10	21	81	25	1,022	-	1,022

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TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS										LOCAL - LOCAUX		
				DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS					
			TOTAL	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.	CIVILS	MIL.	TOTAL
FORT CHIPEWYAN, ALTA.	1979	8,910	7,183	745	5,336	891	-	4	-	207	-	1,727	-	1,727
	1978	5,982	4,635	959	2,861	605	1	-	1	204	4	1,347	-	1,347
	1977	5,639	3,033	1,187	1,393	325	-	-	-	128	-	2,606	-	2,606
	1976	6,213	3,480	603	2,131	568	-	2	1	171	4	2,733	-	2,733
	1975	5,514	3,317	609	2,250	305	-	4	-	115	34	2,173	24	2,197
FORT FRANCES, ONT.	1979	12,801	9,242	2,410	1,398	2,865	14	95	2,288	168	4	3,559	-	3,559
	1978	14,709	8,644	2,428	1,165	2,667	20	70	2,171	113	10	6,065	-	6,065
	1977	11,570	8,061	2,914	784	2,453	11	57	1,774	57	11	3,509	-	3,509
	1976	9,014	8,058	3,002	435	2,609	17	32	1,906	49	8	956	-	956
	1975	6,903	6,216	1,804	486	2,972	8	16	828	92	10	685	2	687
FORT GEORGE, QUE.	1979	3,299	2,721	2,017	547	122	6	1	-	28	-	578	-	578
	1978	3,368	3,021	1,524	866	376	8	1	-	12	234	347	-	347
	1977	2,909	2,408	1,285	839	202	2	2	-	19	59	489	12	501
	1976	2,051	2,041	1,039	863	107	3	-	1	28	-	10	-	10
	1975	3,061	2,927	1,731	950	179	6	2	-	34	25	130	4	134
FORT MCPHERSON, N.W.T./T.N.-O.	*1979	512	472	98	231	123	-	-	1	18	1	40	-	40
FORT NELSON, B.C./C.B.	1979	29,710	27,194	2,375	12,345	12,029	-	39	22	181	203	2,508	8	2,516
	1978	36,611	30,455	1,949	13,172	15,040	2	1	34	192	65	6,150	6	6,156
	1977	36,599	24,136	1,485	9,343	12,918	-	5	45	195	145	12,399	64	12,463
	1976	26,338	20,423	1,493	6,920	11,470	-	1	38	222	279	5,907	8	5,915
	1975	20,824	17,489	1,398	4,686	10,948	-	-	34	134	289	3,329	6	3,335
FORT RESOLUTION, N.W.T./T.N.-O.	1979	1,688	888	16	641	89	-	2	-	70	70	800	-	800
	1978	1,555	1,505	10	957	159	-	1	-	96	282	50	-	50
	1977	2,502	2,488	66	1,967	236	-	4	4	119	92	14	-	14
	1976	965	849	79	408	240	-	1	6	109	6	114	2	116
	1975	1,023	893	410	229	145	1	13	10	73	12	126	4	130
FORT SIMPSON, N.W.T./T.N.-O.	1979	5,438	2,635	812	1,011	602	1	16	10	136	47	2,799	4	2,803
	1978	3,624	2,756	798	801	844	2	25	32	173	81	814	54	868
	1977	5,895	3,571	680	1,277	1,157	6	91	79	191	90	2,280	44	2,324
	1976	3,586	3,429	958	1,025	1,041	25	101	43	192	44	129	28	157
	1975	3,886	3,298	1,072	1,286	680	27	36	1	172	24	565	23	588
FORT SMITH, N.W.T./T.N.-O.	1979	10,579	8,718	1,465	6,056	965	2	5	-	186	39	1,861	-	1,861
	1978	11,091	8,804	1,447	5,585	1,294	2	5	3	295	173	2,277	10	2,287
	1977	11,671	8,053	1,406	5,034	1,264	-	5	4	275	65	3,609	9	3,618
	1976	8,961	6,639	1,829	3,361	1,153	-	5	1	192	98	2,292	30	2,322
	1975	7,106	6,625	2,300	3,270	804	10	6	6	123	106	479	2	481
FROBISHER, N.W.T./T.N.-O.	1979	7,342	7,061	4,624	417	773	186	70	183	353	455	281	-	281
	1978	8,790	8,020	4,252	874	1,217	275	78	251	413	660	735	35	770
	1977	7,407	7,305	2,824	1,199	717	223	107	163	382	1,690	102	-	102
	1976	7,290	7,290	4,173	624	707	201	55	163	396	971	-	-	-
	1975	5,756	5,752	3,668	313	642	155	45	130	347	452	4	-	4
GAGNON, QUE.	1979	3,273	2,125	1,275	482	329	-	-	5	34	-	1,148	-	1,148
	1978	3,593	2,419	1,277	636	451	2	-	3	46	4	1,172	2	1,174
	1977	2,685	2,402	1,249	640	454	2	-	1	56	-	283	-	283
	1976	5,451	4,902	2,931	1,390	518	4	2	1	56	-	549	-	549
	1975	3,694	3,179	2,123	531	465	2	-	3	55	-	509	6	515
GASPÉ, QUE.	1979	5,464	5,171	2,820	1,691	347	-	4	39	244	26	283	10	293
	1978	6,517	5,851	2,520	2,444	483	2	9	45	281	67	627	39	666
	1977	6,877	5,826	2,796	2,310	354	1	10	58	253	44	1,035	16	1,051
	1976	7,105	5,346	3,000	1,651	320	1	5	56	293	20	1,751	8	1,759
	1975	8,746	6,931	3,866	2,191	385	3	3	27	333	123	1,807	8	1,815
GATINEAU, QUE.	1979	24,324	7,771	31	4,759	2,303	-	4	10	644	20	16,547	6	16,553
	1978	23,238	2,720	20	1,538	987	-	1	2	166	6	20,516	2	20,518
	1977	22,314	864	5	358	481	-	1	2	17	-	21,442	8	21,450
	*1976	974	47	6	27	14	-	-	-	-	-	927	-	927
GILLAM, MAN.	1979	7,501	4,715	2,540	1,518	326	56	70	6	197	2	2,786	-	2,786
	1978	7,308	4,694	2,988	883	310	74	107	7	321	4	2,614	-	2,614
	1977	9,261	6,547	4,092	1,079	491	109	141	42	583	10	2,712	2	2,714
	1976	7,427	6,337	3,948	1,070	487	174	81	11	562	4	1,081	9	1,090
	1975	8,958	7,996	4,621	1,965	680	-	154	34	523	19	962	-	962

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TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS: TOTAL	DOMESTIC / INTÉRIEURS: CARRIERS / TRANSPORT.	DOMESTIC / INTÉRIEURS: OTHER COMM. / AUTRES COMM.	DOMESTIC / INTÉRIEURS: PRIV.	INTERNATIONAL / INTERNATIONAUX: CARRIERS / TRANSPORT.	INTERNATIONAL / INTERNATIONAUX: OTHER COMM. / AUTRES COMM.	INTERNATIONAL / INTERNATIONAUX: PRIV.	GOVERNMENT / OFFICIELS: CIV.	GOVERNMENT / OFFICIELS: MIL.	LOCAL - LOCAUX: CIVILS	LOCAL - LOCAUX: MIL	LOCAL - LOCAUX: TOTAL
GOD'S LAKE NARROWS, MAN.	*1979	4,800	4,798	2,616	1,699	167	-	-	-	316	-	2	-	2
GODERICH, ONT.	*1979	11,754	2,956	111	1,353	1,267	13	107	71	31	3	8,798	-	8,798
GORE BAY, ONT.	1979	3,373	2,473	86	587	1,130	-	19	596	53	2	900	-	900
	1978	3,414	2,290	94	437	1,125	3	12	584	33	2	1,124	-	1,124
	1977	3,889	1,990	59	361	1,061	1	6	465	37	-	1,899	-	1,899
	1976	4,463	2,437	124	428	1,333	-	5	500	46	1	2,026	-	2,026
	1975	4,606	2,934	36	716	1,744	-	11	369	52	6	1,672	-	1,672
GRAND FORKS, B.C./C.B.	1979	3,927	1,843	396	343	976	-	3	95	26	4	990	1,094	2,084
	1978	3,595	1,701	323	348	909	-	3	81	18	19	678	1,216	1,894
	1977	3,861	2,028	633	416	872	2	-	84	16	5	1,461	372	1,833
	1976	6,872	2,513	1,004	424	993	6	4	64	10	8	3,659	700	4,359
	1975	10,119	2,583	1,076	624	826	1	2	32	22	-	7,536	-	7,536
GRISE FIORD, N.W.T./T.N.-O.	*1979	47	45	17	2	11	-	-	-	11	4	2	-	2
GUELPH, ONT.	1979	64,840	410	18	84	296	-	-	12	-	-	64,430	-	64,430
	1978	78,049	354	12	94	240	-	-	4	4	-	77,695	-	77,695
	1977	69,801	367	15	88	241	-	3	14	4	2	69,434	-	69,434
	1976	80,279	572	25	131	386	-	6	16	8	-	79,707	-	79,707
	1975	67,691	623	24	148	447	-	1	1	2	-	67,068	-	67,068
HALL BEACH, N.W.T./T.N.-O.	1979	2,572	2,572	2,121	96	83	17	-	-	37	218	-	-	-
	1978	2,556	2,556	2,229	51	87	31	-	6	76	76	-	-	-
	1977	2,415	2,359	1,070	894	173	8	6	-	78	130	50	6	56
	1976	2,156	2,091	1,810	126	75	14	-	-	55	11	65	-	65
HAY RIVER, N.W.T./T.N.-O.	1979	7,368	6,310	2,017	2,366	1,573	3	18	21	284	28	1,012	46	1,058
	1978	12,162	7,631	2,043	2,676	2,249	1	2	14	385	261	4,527	4	4,531
	1977	15,433	8,115	2,094	3,240	2,336	1	3	3	337	101	7,274	44	7,318
	1976	16,979	6,832	1,841	2,106	2,570	2	4	3	237	69	10,131	16	10,147
	1975	10,222	6,896	1,869	2,431	2,225	3	1	2	293	72	3,300	26	3,326
HOLMAN ISLAND, N.W.T./T.N.-O.	*1979	604	566	311	195	31	1	2	-	16	10	38	-	38
IGLOOLIK, N.W.T./T.N.-O.	*1979	158	158	132	5	15	-	-	-	6	-	-	-	-
ÎLES-DE-LA-MADELEINE, QUE.	1979	674	672	531	133	-	-	-	-	8	-	-	2	2
	1978	1,899	1,727	1,260	370	51	-	-	-	46	-	172	-	172
	1977	3,099	2,738	2,428	134	43	1	-	-	132	-	359	2	361
	1976	4,926	3,230	2,614	211	224	2	-	1	178	-	1,687	9	1,696
	1975	5,551	3,238	2,814	139	52	3	-	-	224	6	2,307	6	2,313
ILFORD, MAN.	*1979	381	309	46	116	103	-	-	-	44	-	72	-	72
INOUCDJOUAC, QUE.	1979	1,702	1,623	1,397	164	58	2	-	-	2	-	79	-	79
	1978	2,007	1,992	1,610	141	39	5	1	1	187	8	15	-	15
	1977	1,799	1,797	1,591	84	14	-	-	-	108	-	2	-	2
	1976	1,854	1,802	1,568	83	117	-	-	2	30	2	52	-	52
	1975	1,223	1,193	745	262	173	3	-	-	10	-	30	-	30
ISLAND LAKE, MAN.	1979	11,908	11,665	9,094	2,209	267	1	-	-	94	-	243	-	243
	1978	12,437	12,263	9,359	2,632	171	1	-	-	99	1	174	-	174
	1977	15,811	15,638	8,850	5,396	935	12	8	9	427	1	173	-	173
	*1976	14,660	11,758	2,450	8,293	527	4	15	8	419	42	2,902	-	2,902
KAPUSKASING, ONT.	1979	15,587	9,677	2,076	4,837	2,536	-	1	44	156	27	5,910	-	5,910
	1978	27,633	6,317	3,208	1,660	1,270	-	1	23	141	14	21,316	-	21,316
	1977	14,250	4,773	2,853	768	993	8	3	24	109	15	9,477	-	9,477
	1976	7,539	4,156	2,732	371	889	4	-	31	117	12	3,383	-	3,383
	1975	6,533	3,845	2,753	196	706	3	1	37	120	29	2,688	-	2,688
KENORA, ONT.	1979	18,783	8,901	2,938	1,713	1,901	6	29	1,541	325	448	9,860	22	9,882
	1978	17,562	8,758	2,642	1,409	2,218	20	118	1,528	190	633	8,778	26	8,804
	1977	12,215	7,751	3,127	935	1,826	18	27	1,255	182	381	4,443	21	4,464
	1976	14,380	9,138	3,046	1,914	2,104	10	42	1,580	208	234	5,242	-	5,242
	1975	15,647	6,738	1,354	1,556	1,850	9	12	1,494	190	273	8,902	7	8,909
KINGSTON, ONT.	1979	42,048	20,532	1,755	11,829	4,986	209	316	663	437	337	21,516	-	21,516
	1978	127,726	19,881	4,354	7,712	5,496	953	244	618	210	294	107,839	6	107,845
	1977	105,486	12,988	1,990	4,503	4,218	1,032	251	656	145	193	92,498	-	92,498
	1976	91,032	9,342	1,040	3,433	2,966	697	196	413	178	419	81,687	3	81,690
	1975	50,484	2,208	307	619	735	346	8	123	21	49	48,270	6	48,276

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TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
				DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS				
			TOTAL	CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.	CIVILS	MIL.	TOTAL
KIRKLAND LAKE, ONT.	1979	3,865	3,397	2,877	220	250	1	-	-	48	1	468	-	468
	1978	4,546	3,789	2,912	404	387	2	-	3	70	11	757	-	757
	1977	3,345	3,099	2,423	410	233	5	-	1	22	5	246	-	246
	1976	3,172	2,795	2,264	236	262	5	-	1	26	1	377	-	377
	1975	3,092	2,913	2,524	152	199	4	-	2	32	-	179	-	179
LA GRANDE, QUE.	1979	11,235	11,077	3,008	6,761	944	-	6	15	310	33	158	-	158
	1978	19,542	15,932	4,287	8,652	2,339	3	4	3	254	390	3,610	-	3,610
	1977	19,232	16,201	4,167	9,885	1,621	9	32	12	286	189	3,031	-	3,031
	1976	16,825	15,492	3,658	9,599	1,875	3	23	5	293	36	1,333	-	1,333
	1975	14,828	6,535	3,506	1,962	911	-	17	20	112	7	8,288	5	8,293
LA RONGE, SASK.	1979	19,066	12,643	2,525	5,987	2,613	2	37	212	1,203	64	6,423	-	6,423
	1978	17,447	11,995	2,956	5,718	2,037	7	12	215	1,029	21	5,448	4	5,452
	1977	22,459	11,513	3,194	4,175	2,836	17	31	208	994	58	10,945	1	10,946
	*1976	1,940	1,020	299	463	133	7	4	2	108	4	920	-	920
LACHUTE, QUE.	1979	23,207	2,064	19	957	1,035	-	8	14	25	6	21,143	-	21,143
	*1978	7,185	1,205	4	661	519	-	6	7	8	-	5,980	-	5,980
LAKE HARBOUR, N.W.T./T.N.-O.	*1979	269	264	199	2	21	-	-	-	29	13	-	5	5
LITTLE GRAND RAPIDS, MAN.	*1979	962	962	232	432	64	-	-	-	234	-	-	-	-
LYNN LAKE, MAN.	1979	9,087	8,312	4,816	1,485	1,759	10	3	24	206	9	775	-	775
	1978	8,113	7,385	4,525	1,315	1,270	6	10	59	180	20	725	3	728
	1977	8,050	7,247	4,103	1,477	1,152	13	4	48	383	67	795	8	803
	1976	9,118	6,738	4,089	990	1,114	72	9	65	390	9	2,374	6	2,380
	1975	8,492	7,680	5,289	764	1,018	-	13	47	467	82	730	82	812
MAPLE, ONT.	1979	144,280	97	8	26	51	-	-	2	10	-	144,183	-	144,183
	1978	153,574	255	5	80	162	-	1	5	2	-	153,319	-	153,319
	1977	175,344	458	14	154	270	-	2	10	8	-	174,886	-	174,886
	1976	171,839	248	2	76	158	-	3	7	2	-	171,591	-	171,591
	*1975	98,853	636	9	152	461	-	-	14	-	-	98,217	-	98,217
MATAGAMI, QUE.	1979	6,573	6,176	2,146	3,383	520	2	-	2	121	2	397	-	397
	1978	5,892	5,667	1,921	3,213	413	-	2	5	94	19	222	3	225
	1977	5,730	4,820	1,564	2,543	573	2	1	2	125	10	903	7	910
	1976	8,214	5,311	1,936	1,771	1,250	-	2	7	69	276	2,894	9	2,903
	1975	7,089	6,405	3,141	1,948	1,208	2	-	3	77	26	654	30	684
MATANE, QUE.	1979	5,282	4,203	1,456	2,251	385	-	-	-	111	-	1,077	2	1,079
	1978	6,571	5,203	1,759	2,709	608	-	-	1	122	4	1,367	1	1,368
	1977	2,434	2,168	1,069	757	280	1	1	-	44	16	256	10	266
	1976	1,502	1,366	635	533	166	-	1	1	30	-	136	-	136
	*1975	739	739	404	234	69	-	-	-	32	-	-	-	-
MAYO, Y.T./T.Y.	1979	6,105	5,692	918	4,195	488	-	1	4	86	-	413	-	413
	1978	5,141	4,569	546	3,514	369	1	2	5	118	14	572	-	572
	1977	4,576	3,789	444	2,875	322	-	4	2	100	42	773	14	787
	1976	5,563	3,519	513	2,394	459	1	1	1	102	48	2,044	-	2,044
	1975	11,226	5,618	1,132	3,640	677	2	1	4	128	34	5,608	-	5,608
MEDICINE HAT, ALTA.	1979	25,411	17,880	2,956	7,272	6,824	1	47	358	239	183	7,511	20	7,531
	1978	27,379	18,815	3,158	7,880	7,074	4	49	282	229	139	8,564	-	8,564
	1977	34,466	19,355	3,418	7,809	7,289	10	74	361	213	181	15,111	-	15,111
	1976	47,101	20,377	4,238	7,636	7,653	3	94	389	249	115	26,724	-	26,724
	1975	36,825	12,585	3,194	3,387	5,490	5	19	234	102	154	24,236	4	24,240
MIDLAND, ONT.	1979	2,531	708	39	221	424	2	5	17	-	-	1,823	-	1,823
	1978	7,481	289	14	81	182	1	1	10	-	-	7,192	-	7,192
	1977	7,509	913	55	282	563	-	-	7	6	-	6,596	-	6,596
	1976	4,486	242	16	68	152	-	-	4	2	-	4,244	-	4,244
	1975	12,669	810	21	188	581	-	1	17	2	-	11,859	-	11,859
MINGAN, QUE.	1979	3,182	3,097	1,994	1,005	57	-	-	9	32	-	85	-	85
	1978	1,944	1,853	1,730	76	29	-	-	-	18	-	91	-	91
	1977	2,919	1,522	1,330	101	79	-	-	-	12	-	1,397	-	1,397
	1976	907	847	579	173	69	-	2	2	22	-	60	-	60
	1975	934	931	862	43	22	2	-	-	2	-	3	-	3

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TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS		CIVILS	MIL.	TOTAL
				CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.			
MONT JOLI, QUE.	1979	12,771	11,772	7,424	2,903	779	1	37	36	492	100	999	-	999
	1978	16,201	14,973	9,034	4,306	804	3	78	65	574	109	1,213	15	1,228
	1977	16,003	14,747	8,911	4,007	713	-	219	136	547	214	1,224	32	1,256
	1976	14,766	13,783	8,413	3,751	676	7	161	99	429	247	977	6	983
	1975	14,989	14,352	9,236	3,728	744	-	11	41	447	145	636	1	637
MOOSE LAKE, MAN.	*1979	154	154	24	116	2	-	-	-	12	-	-	-	-
MOOSONEE, ONT.	1979	8,292	8,026	4,262	3,020	306	2	-	-	432	4	266	-	266
	1978	8,055	7,653	3,918	2,969	357	3	-	1	389	16	402	-	402
	1977	9,878	8,902	4,187	3,849	375	4	2	-	481	4	976	-	976
	1976	11,004	10,856	4,259	5,731	465	11	8	1	310	71	148	-	148
	1975	10,680	10,128	4,324	4,881	524	3	1	3	388	4	552	-	552
MUSKOKA, ONT.	1979	30,976	11,446	-	5,229	5,163	-	10	486	240	318	19,404	126	19,530
	1978	29,483	12,776	-	5,466	6,140	-	25	538	236	371	16,545	162	16,707
	1977	26,615	10,928	-	4,670	5,377	-	11	534	144	192	15,519	168	15,687
	1976	22,131	11,141	-	4,725	5,593	-	32	606	143	42	10,989	1	10,990
	1975	22,526	10,645	-	4,400	5,372	-	10	562	109	192	11,613	268	11,881
NANAIMO, B.C./C.B.	1979	38,988	19,708	7,001	5,907	6,145	-	19	383	201	52	19,278	2	19,280
	*1978	42,324	20,553	6,057	6,870	6,583	2	34	346	304	357	21,757	14	21,771
NANISIVIK, N.W.T./T.N.-O.	1979	1,145	1,050	725	66	49	56	4	5	100	45	93	2	95
	1978	1,619	1,165	750	115	88	38	10	6	33	125	114	340	454
	*1977	926	921	690	102	39	4	3	-	25	58	3	2	5
NATASHQUAN, QUE.	1979	1,092	773	668	52	45	-	-	-	8	-	319	-	319
	1978	1,110	1,110	984	79	46	1	-	-	-	-	-	-	-
	1977	1,082	1,082	900	91	70	6	6	-	9	-	-	-	-
	1976	1,230	1,230	1,083	76	63	-	-	-	8	-	-	-	-
	1975	1,323	1,323	1,206	14	94	1	-	-	8	-	-	-	-
NORMAN WELLS, N.W.T./T.N.-O.	1979	12,400	9,655	2,256	5,957	1,116	8	58	13	207	40	2,731	14	2,745
	1978	17,992	9,392	2,238	5,710	950	4	90	10	299	91	8,553	47	8,600
	1977	11,251	10,797	2,620	5,577	2,053	6	119	19	301	102	446	8	454
	1976	11,825	11,682	2,391	6,410	2,514	1	36	8	234	88	142	1	143
	1975	17,461	17,359	4,671	9,919	2,345	-	100	-	224	100	102	-	102
NORTH BATTLEFORD, SASK.	1979	18,332	6,120	262	2,670	2,686	1	8	33	408	52	11,964	248	12,212
	1978	15,340	5,835	100	2,195	2,855	-	9	28	560	88	9,475	30	9,505
	1977	19,379	6,440	57	2,798	2,895	-	9	24	583	74	12,939	-	12,939
	1976	10,013	5,469	28	2,338	2,544	-	7	26	443	83	4,544	-	4,544
	1975	6,649	5,069	237	1,898	2,337	-	4	12	455	126	1,580	-	1,580
NORWAY HOUSE, MAN.	1979	7,501	7,348	3,891	2,318	257	193	56	13	612	8	153	-	153
	1978	6,209	6,153	3,493	1,813	288	11	25	12	471	40	56	-	56
	1977	9,271	9,148	5,406	1,265	682	97	12	41	1,173	472	121	2	123
	1976	10,107	9,692	2,652	3,148	2,328	10	21	20	1,009	504	415	-	415
	1975	9,555	9,547	3,110	2,493	2,796	15	2	6	1,034	91	8	-	8
OXFORD HOUSE, MAN.	*1979	2,978	2,978	1,844	889	69	-	-	-	176	-	-	-	-
PANGNIRTUNG, N.W.T./T.N.-O.	1979	1,245	1,072	874	39	49	1	-	-	83	26	169	4	173
	1978	809	809	561	66	69	2	-	-	46	65	-	-	-
	*1977	922	922	137	246	51	-	4	-	56	428	-	-	-
PEACE RIVER, ALTA.	1979	26,400	14,814	2,037	6,168	5,336	6	81	34	923	229	11,586	-	11,586
	1978	30,264	16,917	2,146	7,090	6,243	4	188	121	1,026	99	13,329	18	13,347
	1977	29,452	15,190	2,014	5,993	5,867	9	185	56	1,002	64	14,262	-	14,262
	1976	26,436	11,574	1,671	4,917	4,145	-	16	5	761	59	14,862	-	14,862
	1975	23,496	10,024	1,211	5,022	2,971	3	31	5	759	22	13,472	-	13,472
PEMBROKE, ONT.	1979	12,869	2,809	2,383	74	160	5	2	17	15	153	9,708	352	10,060
	1978	11,440	2,123	1,620	108	287	3	4	45	11	45	9,242	75	9,317
	1977	12,435	1,602	1,077	108	343	-	-	8	19	47	10,749	84	10,833
	1976	12,620	2,409	1,525	222	508	5	-	60	27	62	10,174	37	10,211
	1975	13,213	2,514	1,169	369	873	1	-	34	54	14	10,695	4	10,699
PETERBOROUGH, ONT.	1979	49,369	4,811	2,007	1,478	1,141	12	32	105	30	6	44,550	8	44,558
	1978	13,531	1,866	424	584	754	1	1	69	31	2	11,664	1	11,665
	1977	10,236	1,945	654	475	712	10	5	56	29	4	8,291	-	8,291
	1976	11,797	1,936	107	619	1,072	4	25	57	50	2	9,861	-	9,861
	1975	22,137	3,723	248	1,219	1,992	5	46	137	64	12	18,414	-	18,414

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TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS		CIVILS	MIL.	TOTAL
				CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.			
POND INLET, N.W.T./T.N.-O.	1979	2,616	2,487	1,162	822	284	6	1	3	80	129	128	1	129
	1978	2,027	2,001	777	745	367	3	7	5	33	64	26	-	26
	*1977	593	592	144	75	65	-	-	-	24	284	-	1	1
POPLAR RIVER, MAN.	*1979	1,312	1,312	-	1,248	20	-	-	-	44	-	-	-	-
PORT ELGIN, ONT	*1979	8,952	2,758	34	564	2,146	-	-	8	6	-	6,188	6	6,194
PORT HARDY, B.C./C.B.	1979	19,240	18,173	1,827	10,105	4,067	6	503	510	909	246	1,051	16	1,067
	1978	25,362	17,503	7,222	4,253	3,992	38	84	381	957	576	7,818	41	7,859
	1977	14,325	12,244	4,924	2,502	3,382	34	53	305	791	253	2,067	14	2,081
	*1976	15,694	12,511	3,983	4,089	3,250	40	28	286	626	209	3,155	28	3,183
	*1975	17,667	13,444	1,582	7,423	3,200	99,999	23	284	671	261	4,193	30	4,223
POSTE DE LA BALEINE, QUE.	1979	8,425	7,699	2,414	4,610	505	2	7	-	159	2	720	6	726
	1978	8,934	8,186	3,483	4,158	302	1	-	1	88	153	738	10	748
	1977	9,029	8,031	3,486	3,847	363	3	1	-	305	26	990	8	998
	1976	7,145	6,667	4,011	2,142	403	4	1	-	93	13	477	1	478
	*1975	3,177	3,089	1,389	1,290	380	4	1	-	23	2	87	1	88
PRINCE ALBERT, SASK.	1979	30,717	16,360	2,463	7,495	4,505	1	25	157	1,666	48	14,357	-	14,357
	1978	31,291	16,676	3,537	6,195	4,769	1	35	196	1,885	58	14,558	57	14,615
	1977	28,410	17,260	4,199	5,292	5,502	10	29	250	1,885	93	11,100	50	11,150
	1976	25,989	15,016	3,680	4,327	5,433	15	18	217	1,263	63	10,973	-	10,973
	1975	30,118	13,745	3,999	4,474	3,830	12	9	129	1,218	74	16,371	2	16,373
PRINCE RUPERT, B.C./C.B.	1979	6,181	6,181	4,231	666	563	39	8	210	396	68	-	-	-
	1978	6,569	6,553	4,601	549	644	14	15	191	494	45	16	-	16
	1977	6,871	5,910	4,433	406	457	33	9	167	348	57	951	10	961
	1976	7,436	7,326	5,872	251	589	112	4	209	230	59	110	-	110
	1975	7,769	7,725	6,662	133	521	-	4	202	167	36	44	-	44
PUKATAWAGAN, MAN.	*1979	784	784	300	382	14	-	-	-	88	-	-	-	-
QUESNEL, B.C./C.B.	1979	12,753	7,017	2,159	1,520	3,132	2	3	61	134	6	5,736	-	5,736
	1978	15,271	6,960	1,639	1,476	3,588	1	5	60	158	33	8,311	-	8,311
	1977	14,580	6,400	1,524	1,409	3,213	4	6	74	119	51	8,158	22	8,180
	1976	14,337	5,403	1,052	1,340	2,830	2	4	69	91	15	8,934	-	8,934
	1975	15,456	5,525	1,222	1,458	2,616	-	8	46	117	58	9,927	4	9,931
RAINBOW LAKE, ALTA.	1979	862	804	333	135	322	-	-	-	6	8	58	-	58
	1978	590	590	244	56	288	-	-	-	2	-	-	-	-
	1977	803	803	337	100	355	-	-	-	11	-	-	-	-
	1976	1,338	840	193	209	432	-	-	-	6	-	498	-	498
	1975	1,192	1,026	2	621	389	-	-	-	14	-	166	-	166
RANKIN INLET, N.W.T./T.N.-O.	*1979	3,233	3,127	2,433	386	213	5	1	-	77	12	106	-	106
RED DEER, ALTA.	1979	51,714	23,720	1,407	9,556	11,675	-	29	77	459	517	27,562	432	27,994
	1978	49,078	24,071	1,367	8,320	12,820	-	19	86	505	954	24,769	238	25,007
	1977	57,112	25,791	1,486	8,974	14,054	3	31	139	587	517	31,269	52	31,321
	1976	55,396	21,955	1,124	8,549	11,254	1	22	91	414	500	33,399	42	33,441
	1975	49,944	20,215	1,801	8,841	8,629	1	21	68	249	605	29,643	86	29,729
RED LAKE, ONT.	1979	12,791	9,209	4,449	2,003	1,925	10	13	641	125	43	3,582	-	3,582
	1978	11,457	9,182	3,978	2,580	1,668	13	20	704	130	89	2,275	-	2,275
	*1977	11,080	8,510	3,251	2,331	2,098	14	12	648	143	13	2,570	-	2,570
RED SUCKER LAKE, MAN.	1979	1,792	1,792	1,135	608	47	2	-	-	-	-	-	-	-
	1978	914	914	633	250	27	-	-	-	4	-	-	-	-
	*1977	1,741	1,741	1,233	268	157	3	1	-	77	2	-	-	-
REPULSE BAY, N.W.T./T.N.-O.	*1979	88	88	62	17	1	-	-	-	8	-	-	-	-
RESOLUTE, N.W.T./T.N.-O.	1979	5,697	5,697	3,998	875	180	198	18	6	289	133	-	-	-
	1978	7,762	7,498	5,536	815	293	123	9	4	445	273	250	14	264
	1977	9,968	9,720	5,876	2,004	578	93	24	15	501	629	240	8	248
	1976	10,511	10,456	7,092	1,888	1,039	85	17	17	185	133	54	1	55
	1975	25,112	14,044	9,288	1,963	2,106	146	48	17	202	274	10,872	196	11,068
RIMOUSKI, QUE.	1979	46,837	7,476	2,539	3,124	1,102	23	5	19	658	6	39,325	36	39,361
	1978	40,697	7,717	3,111	2,994	1,065	1	4	8	531	3	32,978	2	32,980
	1977	25,331	7,545	3,125	3,175	929	8	12	22	266	8	17,705	81	17,786
	1976	33,047	6,698	2,736	2,682	892	6	8	16	356	2	26,274	75	26,349
	1975	32,868	6,936	3,006	2,625	872	-	1	1	427	4	25,892	40	25,932

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TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS										LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS				
				CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.	CIVILS	MIL.	TOTAL
RIVIÈRE-DU-LOUP, QUE.	*1979	3,934	1,216	383	396	336	1	5	22	71	2	2,716	2	2,718
ROBERVAL, QUE.	1979	5,305	5,287	427	3,196	1,208	-	4	24	414	14	18	-	18
	1978	6,840	6,697	675	3,664	1,819	1	3	33	467	35	143	-	143
	1977	6,722	6,206	599	3,635	1,585	-	6	27	338	16	516	-	516
	1976	5,624	5,032	729	2,874	967	-	2	21	413	26	592	-	592
	1975	6,401	5,828	2,395	1,745	1,167	5	5	22	481	8	569	4	573
ROUYN/NORANDA, QUE.	1979	10,387	5,986	1,736	2,657	1,173	-	1	8	349	62	4,401	-	4,401
	1978	12,520	5,812	1,865	2,348	1,215	-	1	10	354	19	6,708	-	6,708
	1977	16,834	5,218	1,828	1,970	1,107	-	4	9	264	36	11,616	-	11,616
	1976	15,986	6,154	2,052	2,584	1,164	1	49	17	247	40	9,796	36	9,832
	1975	18,577	6,863	2,516	2,634	1,159	-	5	7	519	23	11,714	-	11,714
SACHS HARBOUR, N.W.T./T.N.-O.	1979	783	731	217	442	43	1	-	-	26	2	52	-	52
	1978	715	715	224	432	20	-	4	2	31	2	-	-	-
	1977	692	677	350	233	37	1	2	-	42	12	15	-	15
	1976	869	823	239	491	49	-	1	-	43	-	46	-	46
	1975	1,200	1,194	334	637	173	1	-	-	45	4	6	-	6
SANDSPIT, B.C./C.B.	1979	12,542	12,375	7,495	3,149	1,296	12	35	28	197	163	163	4	167
	1978	11,691	11,015	7,690	1,500	1,236	35	1	29	325	199	674	2	676
	1977	17,848	10,065	6,835	579	2,282	52	4	34	183	96	7,783	-	7,783
	1976	10,317	9,813	6,606	386	2,533	11	1	31	138	107	504	-	504
	1975	8,620	8,234	6,453	209	1,296	22	1	46	100	107	386	-	386
SANIKILUAQ, N.W.T./T.N.-O.	*1979	1,036	1,034	910	61	43	1	-	-	17	2	2	-	2
SARNIA, ONT.	1979	48,693	5,314	2,351	1,188	1,301	3	79	350	36	6	43,375	4	43,379
	1978	1,090	957	44	375	465	-	6	55	10	2	133	-	133
	1977	32,234	2,822	2,112	320	354	5	7	20	4	-	29,412	-	29,412
	1976	46,922	6,973	4,130	1,133	1,360	17	74	209	30	20	39,933	16	39,949
	1975	14,625	2,159	1,855	142	134	1	4	15	8	-	12,466	-	12,466
SCHEFFERVILLE (KNOB L.), QUE.	1979	12,941	12,597	498	9,234	2,572	-	8	18	247	20	344	-	344
	1978	13,042	12,629	764	8,774	2,799	-	14	14	228	36	413	-	413
	1977	13,074	11,295	580	7,901	2,540	2	6	17	194	55	1,779	-	1,779
	1976	9,367	8,081	616	5,067	2,020	-	1	13	160	204	1,286	-	1,286
	1975	13,512	8,421	628	5,457	2,094	-	2	19	189	32	5,091	-	5,091
SHAMATTAWA, MAN.	*1979	974	972	194	681	11	-	-	-	86	-	2	-	2
SHERBROOKE, QUE.	1979	23,978	8,270	964	3,318	2,387	913	50	236	136	266	15,700	8	15,708
	1978	30,559	8,959	523	3,915	2,966	524	104	339	212	376	21,592	8	21,600
	1977	22,129	6,563	83	2,749	2,795	-	82	362	175	317	15,566	-	15,566
	1976	26,146	5,801	358	2,281	2,141	20	115	340	99	447	20,341	4	20,345
	1975	19,409	6,167	99	2,565	2,642	1	33	254	167	406	13,201	41	13,242
SIOUX LOOKOUT, ONT.	1979	13,505	8,080	4,949	2,052	621	7	10	214	192	35	5,421	4	5,425
	1978	12,505	7,632	4,052	2,311	822	18	9	197	164	59	4,871	2	4,873
	1977	13,731	7,701	4,085	2,424	720	8	5	185	240	34	6,030	-	6,030
	1976	9,289	6,383	3,739	1,271	952	10	-	185	205	21	2,904	2	2,906
	1975	6,193	5,462	3,552	833	679	7	1	136	217	37	731	-	731
SLAVE LAKE, ALTA.	*1979	12,654	10,376	488	5,713	3,754	-	1	6	392	22	2,262	16	2,278
SMITHERS, B.C./C.B.	1979	14,804	6,260	1,717	2,215	2,016	2	41	53	199	17	8,544	-	8,544
	1978	12,345	5,647	2,197	1,121	2,069	-	1	37	215	7	6,698	-	6,698
	1977	16,399	4,409	1,814	719	1,716	1	1	23	128	7	11,990	-	11,990
	1976	6,485	4,097	1,859	524	1,610	3	9	38	47	7	2,388	-	2,388
	1975	8,257	4,860	2,209	911	1,528	3	-	29	166	14	3,397	-	3,397
SOUTH INDIAN LAKE, MAN.	*1979	814	814	412	252	26	-	-	-	122	2	-	-	-
SPLIT LAKE, MAN.	*1979	48	48	-	46	-	-	-	-	2	-	-	-	-
ST. ANTHONY, NFLD./T.-N.	1979	3,429	3,219	209	2,159	233	48	297	39	194	40	210	-	210
	1978	3,862	3,762	423	2,628	328	1	41	11	234	96	97	3	100
	*1977	1,434	1,373	73	1,079	113	1	7	2	78	20	61	-	61
ST. AUGUSTIN, QUE.	*1979	1,098	548	508	24	10	2	-	-	4	-	550	-	550

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APPENDIX "A" CONTINUED

ANNUAL 1979 ANNUEL

TABLE 8 — AIRCRAFT MOVEMENTS BY CLASS AND TYPE OF OPERATION — TABLE 8

TABLEAU 8 — MOUVEMENTS D'APPAREILS PAR CLASSE DE VOL ET TYPE D'EXPLOITATION — TABLEAU 8

AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS									LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS		CIVILS	MIL.	TOTAL
				CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.			
ST. JÉRÔME, QUE.	1979	3,624	2,421	5	781	1,612	-	2	4	9	8	1,195	8	1,203
	1978	13,216	3,438	17	1,806	1,565	-	9	15	17	9	9,778	-	9,778
	1977	36,291	5,223	14	2,638	2,503	-	29	11	22	6	31,062	6	31,068
	1976	45,728	4,805	15	2,988	1,714	-	20	14	26	28	40,919	4	40,923
	1975	42,263	6,386	23	4,190	2,104	-	18	8	33	10	35,869	8	35,877
ST. LAZARE, QUE.	1979	10,827	1,566	12	240	1,299	-	-	9	-	6	9,261	-	9,261
	1978	7,603	457	1	157	293	-	-	4	-	2	7,146	-	7,146
	1977	31,541	1,263	3	434	785	-	5	14	12	10	30,278	-	30,278
	*1976	19,834	1,346	7	347	921	-	5	24	14	28	18,472	16	18,488
ST. THERESA POINT, MAN.	*1979	432	432	116	313	3	-	-	-	-	-	-	-	-
ST.ANDRÉ AVELLIN, QUE.	*1979	2,170	326	-	113	210	-	-	1	2	-	1,844	-	1,844
ST.THOMAS, ONT.	1979	13,358	1,162	15	374	587	-	11	166	9	-	12,196	-	12,196
	1978	29,025	3,151	51	1,215	1,569	-	40	233	40	3	25,874	-	25,874
	1977	21,772	2,511	60	1,142	1,185	2	8	94	16	4	19,261	-	19,261
	1976	19,893	3,351	142	1,255	1,797	-	8	129	20	-	16,542	-	16,542
	*1975	3,165	772	4	296	424	-	7	36	5	-	2,393	-	2,393
STE.ANNE DE SOREL, QUE.	1979	585	54	-	3	51	-	-	-	-	-	531	-	531
	1978	711	126	-	67	59	-	-	-	-	-	585	-	585
	1977	405	135	2	8	123	-	-	-	2	-	270	-	270
	1976	195	85	1	20	62	-	-	-	2	-	110	-	110
	*1975	35	16	-	14	2	-	-	-	-	-	19	-	19
STE.THÉRÈSE, QUE.	1979	23,446	30	-	21	7	-	-	2	-	-	23,416	-	23,416
	1978	28,664	785	1	418	363	-	1	-	-	2	27,879	-	27,879
	*1977	35,324	1,165	3	504	638	-	6	6	8	-	34,159	-	34,159
STEPHENVILLE, NFLD./T.-N.	1979	17,411	5,210	3,203	689	748	59	65	110	183	153	5,721	6,480	12,201
	1978	18,739	6,017	3,618	1,062	714	28	36	86	237	236	9,170	3,552	12,722
	1977	11,300	4,416	2,734	669	544	17	12	60	238	142	6,875	9	6,884
	1976	12,857	4,436	2,855	576	465	47	25	72	257	139	8,419	2	8,421
	1975	6,992	6,629	2,972	2,296	841	52	14	54	267	133	363	-	363
SWIFT CURRENT, SASK.	1979	13,859	7,163	1,073	972	3,792	27	26	157	218	898	6,659	37	6,696
	1978	14,133	7,851	1,194	1,027	4,039	12	24	172	249	1,134	6,242	40	6,282
	1977	16,993	8,325	1,237	1,093	4,819	8	12	152	183	821	8,617	51	8,668
	1976	18,880	8,317	1,560	1,295	4,632	15	18	216	265	316	10,468	95	10,563
	1975	18,741	6,559	947	1,165	4,005	17	13	174	208	30	12,182	-	12,182
TERRACE, B.C./C.B.	1979	11,798	10,216	2,881	5,173	1,856	1	7	45	241	12	1,550	32	1,582
	1978	14,481	12,858	3,644	6,467	2,266	4	8	56	395	18	1,604	19	1,623
	1977	10,353	6,898	2,992	3,227	362	7	1	4	287	18	3,421	34	3,455
	1976	10,731	6,425	3,891	1,959	314	1	5	3	185	67	4,244	62	4,306
	1975	10,870	5,951	3,710	1,693	269	6	6	2	250	15	4,913	6	4,919
TESLIN, Y.T./T.Y.	1979	1,587	1,170	13	373	751	-	-	11	20	2	417	-	417
	1978	1,787	1,478	63	569	811	-	-	19	10	6	309	-	309
	1977	1,746	1,462	9	655	759	-	-	13	24	2	284	-	284
	1976	2,010	1,604	175	606	782	-	-	11	30	-	404	2	406
	1975	1,763	1,279	4	464	764	-	1	19	27	-	484	-	484
THE PAS, MAN.	1979	9,564	5,413	2,366	1,052	1,686	5	9	118	169	8	4,151	-	4,151
	1978	11,051	5,501	1,926	1,128	2,119	3	2	96	191	36	5,548	2	5,550
	1977	9,646	5,805	1,716	1,044	2,488	3	13	132	367	42	3,841	-	3,841
	1976	9,344	5,730	1,932	882	2,394	3	3	114	344	58	3,614	-	3,614
	1975	8,465	5,559	2,006	542	2,127	1	2	79	555	247	2,906	-	2,906
THETFORD MINES, QUE.	*1979	3,719	679	-	204	470	-	-	3	2	-	3,040	-	3,040
TIMMINS, ONT.	1979	20,818	17,757	7,229	6,770	2,926	1	11	148	603	69	3,061	-	3,061
	1978	21,077	18,830	7,898	6,591	3,363	-	10	161	654	153	2,247	-	2,247
	1977	21,274	18,396	8,341	5,273	4,069	-	19	199	451	44	2,878	-	2,878
	1976	25,954	17,472	9,786	3,609	3,422	6	8	173	389	79	8,479	3	8,482
	1975	25,185	15,960	11,680	1,150	2,495	15	-	150	397	73	9,225	-	9,225
TOFINO, B.C./C.B.	1979	2,256	2,252	169	609	1,032	5	5	24	380	28	4	-	4
	1978	2,939	2,788	263	683	1,402	44	4	26	288	78	147	4	151
	1977	2,716	2,648	131	742	1,117	73	164	43	332	46	68	-	68
	1976	2,886	2,674	296	813	1,139	37	227	33	101	28	212	-	212
	1975	4,689	2,558	538	590	1,031	133	110	26	108	22	2,123	8	2,131

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AIRPORTS - AÉROPORTS		TOTAL	ITINERANT - ITINÉRANTS										LOCAL - LOCAUX		
			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS					
				CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.	CIVILS	MIL.	TOTAL
TROIS RIVIÈRES, QUE.	1979	9,993	1,589	15	967	554	-	2	8	36	7	8,394	10	8,404
	1978	176	176	1	129	44	-	1	1	-	-	-	-	-
	1977	2,839	2,700	13	2,058	566	-	9	14	39	1	139	-	139
	1976	1,735	1,231	32	853	318	-	4	12	12	-	499	5	504
	1975	4,693	4,673	77	3,038	1,464	1	19	17	54	3	20	-	20
TUKTOYAKTUK, N.W.T./T.N.-O.	1979	10,035	9,645	1,800	6,443	1,057	19	9	8	305	4	390	-	390
	1978	8,517	8,487	1,796	5,395	1,061	18	19	5	181	12	30	-	30
	1977	7,004	6,976	2,107	3,173	1,444	13	16	4	186	33	28	-	28
	1976	6,401	6,332	1,292	3,563	1,295	15	4	12	145	6	69	-	69
	1975	5,064	5,032	1,433	2,755	589	16	21	5	201	12	32	-	32
URANIUM CITY, SASK.	1979	9,186	8,256	1,777	5,538	704	5	5	9	200	18	930	-	930
	1978	10,273	8,625	2,509	4,984	782	11	5	10	239	85	1,647	1	1,648
	1977	7,537	5,673	2,294	2,641	500	4	5	7	180	42	1,864	-	1,864
	1976	6,496	4,711	1,942	2,174	429	2	5	3	138	18	1,785	-	1,785
	1975	5,644	4,257	2,074	1,742	280	14	2	1	111	33	1,382	5	1,387
VALCOURT, QUE.	*1979	3,191	321	-	136	181	-	1	1	2	-	2,870	-	2,870
VERMILION, ALTA.	1979	10,252	4,511	461	1,145	2,809	-	1	3	82	10	5,729	12	5,741
	1978	13,613	3,897	81	843	2,829	-	-	7	103	34	9,712	4	9,716
	1977	16,107	3,465	17	794	2,515	-	1	5	116	17	12,640	2	12,642
	1976	12,376	3,055	8	587	2,327	-	1	6	105	21	9,321	-	9,321
	1975	9,622	1,301	3	308	919	-	-	4	57	10	8,321	-	8,321
VICTORIAVILLE, QUE.	1979	24,742	3,597	4	779	2,795	-	1	14	4	-	21,145	-	21,145
	1978	15,382	1,528	3	481	1,033	-	1	3	7	-	13,854	-	13,854
	1977	10,570	819	3	138	671	-	-	3	4	-	9,661	90	9,751
	1976	20,341	1,352	8	817	512	1	1	7	6	-	18,892	97	18,989
	*1975	4,967	1,022	3	614	402	-	-	3	-	-	3,945	-	3,945
WABUSH, NFLD./T.-N.	1979	14,270	8,783	2,768	3,422	2,293	3	118	24	129	26	5,453	34	5,487
	1978	11,965	8,732	2,348	3,551	2,591	2	1	17	179	43	3,233	-	3,233
	1977	12,678	10,702	3,510	4,317	2,606	7	1	29	154	78	1,964	12	1,976
	1976	10,354	10,203	3,794	3,560	2,465	6	4	37	242	95	151	-	151
	*1975	10,449	10,306	3,483	3,167	3,419	-	2	33	148	54	143	-	143
WATSON LAKE, Y.T./T.Y.	1979	17,167	11,796	1,345	4,819	5,101	2	35	187	159	148	5,371	-	5,371
	1978	14,240	11,356	1,631	4,214	4,995	1	10	214	207	84	2,878	6	2,884
	1977	14,298	9,056	985	3,008	4,544	2	16	206	232	63	5,242	-	5,242
	1976	15,181	9,430	1,502	2,890	4,458	5	6	186	191	192	5,745	6	5,751
	1975	15,987	14,574	2,631	5,376	5,905	5	15	132	271	239	1,413	-	1,413
WAWA, ONT.	1979	44,544	1,769	1,547	122	78	-	3	14	2	3	42,775	-	42,775
	1978	23,691	1,735	1,518	126	83	-	1	1	6	-	21,953	3	21,956
	1977	9,600	1,705	41	1,465	165	-	3	7	22	2	7,875	20	7,895
	1976	12,643	2,189	620	910	518	3	1	85	46	6	10,403	51	10,454
	*1975	1,015	393	12	296	70	-	-	7	4	4	622	-	622
WELLAND, ONT.	1979	19,048	2,409	29	1,090	1,233	-	9	40	4	4	16,639	-	16,639
	1978	15,749	2,667	14	625	1,939	-	27	50	-	12	13,082	-	13,082
	1977	11,755	2,477	23	447	1,799	-	42	146	20	-	9,278	-	9,278
	1976	16,144	2,333	21	487	1,672	2	13	113	25	-	13,811	-	13,811
	1975	22,829	2,039	33	437	1,513	-	1	24	19	12	20,782	8	20,790
WHALE COVE, N.W.T./T.N.-O.	1979	298	298	242	14	34	-	-	-	8	-	-	-	-
	1978	662	661	510	52	27	-	-	-	13	59	1	-	1
	*1977	760	734	527	137	33	-	-	2	28	7	26	-	26
WHITECOURT, ALTA.	1979	18,230	10,619	196	4,403	5,532	-	8	40	354	86	7,585	26	7,611
	1978	16,365	8,972	66	2,819	5,757	1	7	34	204	84	7,377	16	7,393
	1977	10,872	5,868	59	1,916	3,679	-	5	14	178	17	5,000	4	5,004
	1976	17,453	5,513	71	1,270	4,025	1	2	8	115	21	11,932	8	11,940
	1975	15,166	6,346	95	2,005	3,994	-	-	4	242	6	8,818	2	8,820
WIARTON, ONT.	1979	19,099	7,002	-	4,127	2,459	-	45	198	63	110	12,059	38	12,097
	1978	25,670	9,369	109	4,535	4,096	-	81	296	167	85	16,255	46	16,301
	1977	23,626	7,961	134	3,889	3,373	-	75	311	90	89	15,581	84	15,665
	1976	25,531	7,987	219	3,666	3,465	-	82	411	78	66	17,522	22	17,544
	1975	20,377	5,765	78	2,332	3,010	-	25	220	76	24	14,600	12	14,612

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			TOTAL	DOMESTIC INTÉRIEURS			INTERNATIONAL INTERNATIONAUX			GOVERNMENT OFFICIELS			CIVILS	MIL.	TOTAL
				CARRIERS TRANSPORT.	OTHER COMM. AUTRES COMM.	PRIV.	CARRIERS TRANSPORT	OTHER COMM. AUTRES COMM.	PRIV.	CIV.	MIL.				
WILLIAMS LAKE, B.C./C.B.	1979	26,584	20,508	5,511	7,392	6,885	12	17	299	390	2		5,996	80	6,076
	1978	27,077	17,904	4,099	5,617	7,277	8	61	297	414	131		9,024	149	9,173
	1977	30,170	16,611	2,989	4,570	7,940	11	34	283	389	395		13,549	10	13,559
	1976	22,056	13,102	1,810	3,572	6,795	3	17	241	231	433		8,649	305	8,954
	1975	25,484	13,271	2,178	4,152	6,326	5	13	135	378	84		12,197	16	12,213
WRIGLEY, N.W.T./T.N.-O.	1979	1,292	1,164	168	901	73	-	-	-	22	-		128	-	128
	1978	1,280	1,238	313	788	93	-	4	-	40	-		42	-	42
	1977	1,455	1,275	102	953	164	2	26	-	20	8		180	-	180
	1976	1,455	1,330	320	869	109	2	2	-	26	2		125	-	125
	1975	2,725	2,483	516	1,716	197	-	6	-	48	-		242	-	242
YARMOUTH, N.S./N.É.	1979	4,513	4,513	678	803	1,388	676	33	198	487	250		-	-	-
	1978	7,666	7,666	689	759	4,403	660	23	205	518	409		-	-	-
	1977	7,674	7,674	739	793	4,568	683	18	210	349	314		-	-	-
	1976	7,809	7,809	672	1,011	4,764	668	28	249	121	296		-	-	-
	1975	6,728	6,728	691	759	4,019	675	25	212	172	175		-	-	-
YORK LANDING, MAN.	*1979	1,295	1,295	522	485	212	-	-	-	76	-		-	-	-
YORKTON, SASK.	1979	18,920	7,747	75	3,607	3,504	1	22	197	297	44		11,169	4	11,173
	1978	21,206	7,876	87	3,223	3,791	-	58	199	418	100		13,257	73	13,330
	1977	20,557	6,974	57	2,752	3,421	1	30	169	441	103		13,484	99	13,583
	1976	26,134	7,016	59	2,438	3,734	-	100	151	428	106		18,992	126	19,118
	1975	12,228	4,106	46	874	2,549	2	11	62	394	168		8,096	26	8,122
HIGH ARCTIC STATIONS - STATIONS DE LA HAUTE ARCTIQUE															
EUREKA, N.W.T./T.N.-O.	1979	191	191	185	-	-	-	-	-	-	6		-	-	-
	1978	104	104	98	2	-	-	-	-	-	4		-	-	-
	1977	368	364	-	340	4	-	-	-	4	16		2	2	4
	1976	370	370	-	334	10	-	-	-	2	24		-	-	-
	1975	1,017	1,017	-	967	24	-	-	-	16	10		-	-	-
MOULD BAY, N.W.T./T.N.-O.	1979	118	87	87	-	-	-	-	-	-	-		31	-	31
	1978	128	128	118	2	-	-	-	-	-	8		-	-	-
	1977	184	184	-	148	36	-	-	-	-	-		-	-	-
	1976	170	170	-	170	-	-	-	-	-	-		-	-	-
	1975	211	211	-	189	8	-	-	-	-	14		-	-	-

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APPENDIX "B"

Uncontrolled Airports with Scheduled Air Carrier Operations using Turbojet Aircraft over 12,500 lbs.

Airport	Type Of Zone	On Site FSS	CAP Approach Limits	1979 Traffic	Airline	Type Of Aircraft
Asbestos Hill					ND	737
Cambridge Bay NWT	ATZ	Yes		3016	NV/PW	DC3/727
Charlo NB	ATZ	Yes	308/½	5211	PV	737
Churchill MAN	CZ	Yes	309/½	6781	PW	737
Churchill Falls NFLD	CZ	Yes	718/1	3303	PV	737
Cranbrook BC	CZ	Yes		34512	PW	737
Dawson Creek BC	CZ	Yes		22173	PW	737
Deer Lake NFLD	CZ	Yes	308/½	9591	PV	737
Dryden ONT	CZ		307/1	17898	NR/ND/UH	Otter/737
Flin Flon MAN	CZ	Yes		6083	PW	737
Fort Chimo PQ	ATZ	Yes	316/½	6327	ND	737
Fort Chipewyan ALTA	CZ	Yes		8910	PW	737
Fort Nelson BC	CZ	Yes		29710	CP	737
Fort Simpson NWT	CZ	Yes		5438	PW	737
Fort Smith NWT	CZ	Yes		10579	PW	737
Frobisher Bay NWT	CZ	Yes	300-3/4	7342	HF/ND/NV	748/737/L188
Gagnon PQ	ATZ	Yes	940/2	3273	QB	737/BAC/111/ Turbo Beech/ 748
Gaspe PQ	CZ	Yes	836/1	5464	QB	737/748
Hall Beach NWT	ATZ	Yes	463/1	2572	HF/ND	748/737
Hay River NWT	CZ	Yes		7368	PW	737
High Level	CZ	Yes			PW	737
Inuvik NWT	CZ	Yes			PW	727/737
La Grande PQ	ATZ	Yes	403/1	11235	QB/ND	BAC/111/737
Lynn Lake MAN	CZ	Yes		9087	PW	737
Mont Joli PQ	CZ	Yes	318/½	12771	QB/HV	BAC/111/737/ 748/Turbo Beech/Cessna
Nanisivik	ATZ		502/1½	1145	HF/ND	737/T/Otter
Norman Wells NWT	CZ	Yes		12400	PW	727/737
Peace River ALTA	CZ	Yes		26400	PW/KI	737/T/Otter
Port Hardy BC	CZ	Yes		19240	PW/ZX	737/T/Otter
Poste de la Baleine PQ	ATZ	Yes	590/1½	8425	ND	737
Prince Rupert BC	CZ	Yes		6181	CD/CP/PW	Goose/737/T/ Otter
Quesnel BC	CZ	Yes		12753	PW	T/Otter/737
Resolute NWT	ATZ	Yes	318/½	5697	PW/ND	737/727
Rouyn/Noranda PQ	CZ	Yes	452/1	10387	AC/QB	DC9/BAC/111 /F27

Sandspit BC	CZ	Yes		12542	PW/CD	737/Goose
Schefferville PQ	ATZ	Yes	748/1	12941	QB	BAC/111/737/ F27
Smithers BC	CZ	Yes		14804	PW	T/Otter/737
Stephenville NFLD	CZ	Yes	316/1	17411	AC/PV	DC9/737
Terrace BC	CZ	Yes			CP/PW	737
The Pas MAN	CZ	Yes	411/1		PW	737
Timmins ONT	CZ	Yes	413/1		UH/AC/NR	T/Otter/748/ DC9
Uranium City SASK	ATZ	Yes		9186	NK/PW	F27/737
Wabush NFLD	CZ	Yes	314/½	14270	PV/QB	737/BAC/111
Watson Lake YT	CZ	Yes		17167	CP	737
Williams Lake BC	CZ	Yes		26584	PW	737/T/Otter
Yarmouth NS	CZ	Yes	306/½	4513	AC	DC9

APPENDIX "C"

Uncontrolled Airports with Scheduled Air Carrier Operations using Turboprop Aircraft over 12,500 lbs.

Airport	Type Of Zone	On Site FSS	CAP Approach Limits	1979 Traffic	Airline	Type Of Aircraft
Attawapiskat ONT					UH	748
Blanc Sablon PQ				3996	QB/WS	Beaver/748
Bonaventure PQ					QB	748
Broughton NWT		Yes	2785/1½		HF	748
Buffalo Narrows SASK					NK	F27
Cape Dorset NWT				330	HF/UH	748/T/Otter
Chibougamau PQ	CZ		662/1½	3015	ND	F27
Cluf Lake SASK					NK	F27
Clyde River NWT					HF	748
Coppermine NWT		Yes		2026	NV	DC3/L188
Fort Albany ONT					UH	748
Fort Severn ONT					UH	748
Gatineau PQ	ATZ/TT		630/2	24324	QB	F27
Harrington Hbr PQ					WS/QB	T/Otter/748
Iles de Madeleine PQ	ATZ		434/1	674	PV	748
Kaschechewan ONT					UH	748
Lac La Ronge SASK					NK	F27
Matagami PQ	CZ	Yes	417/1	6573	ND/UH	F27/T/Otter
Meadow Lake SASK					NK	F27
Medicine Hat ALTA	CZ	Yes		25411	KI	Short/T/Otter
Mingan PQ		Yes		3182	WS/QB	748/Turbo Beech/T/Otter
Moosonee ONT	ATZ		415/1	8292	UH	748/T/Otter
Natashquan PQ				1092	QB/WS	748/Turbo Beech/Beaver
Pangnirtung NWT				1245	HF	748
Peterborough ONT	ATZ		572/1	49369	GX/OU	Convair/ST27
Pond Inlet NWT				2616	HF	T/Otter/748
Prince Albert SASK	CZ	Yes		30717	NK	F27
Rankin Inlet NWT	ATZ		434/1	3233	NV	L188
Red Deer ALTA	CZ/TT	Yes		51714	KI	Short/T/Otter
Roberval PQ	CZ	Yes	514/1	5305	EN	Viscount
Sarnia ONT	CZ		406/1	48693	GX	Convair
Stoney Rapids SASK	ATZ	Yes			NK	F27
Winisk ONT		Yes			UH	748
Wollaston Lake SASK					NK	F27

APPENDIX "D"

Uncontrolled Airports with Scheduled Air Carrier Operations
using Non Turbine Aircraft over 12,500 lbs. or
Aircraft under 12,500 lbs.

Airport	Type Of Zone	On Site FSS	CAP Approach Limits	1979 Traffic	Airline	Type Of Aircraft
Akulivik NWT					UH	T/Otter
Alicearm/Kitsault BC					CD	Goose
Atikokan ONT	ATZ		694/2	15239	NR	T/Otter
Baie Johan Beetz PQ					WS	T/Otter
Bella Bella BC					MG	Mallard
Bella Coola BC					MG	Mallard
Berens River MAN				2453	UW	Beechcraft
Blubber Bay BC					ZX	T/Otter
Brockville ONT	ATZ			11958	WJ	Piper
Chapleau ONT	ATZ		495/1	3245	NR	T/Otter
Chatham ONT					PD	Beech Turbo
Cochrane ONT	ATZ				UH	T/Otter
Cross Lake MAN				3540	UW	Beech
Dauphin MAN	CZ	Yes		18342	UW	Swearingen
Duncan BC					ZX	Beaver/T/ Otter
Earlton ONT	CZ	Yes	404/1	10133	NR	T/Otter
East Main PQ					UH	T/Otter
Elliot Lake ONT	ATZ			7634	NR/WJ	T/Otter/Piper
Fort Frances ONT	ATZ		578/1	12801	NR	T/Otter
Fort George PQ			838/1½	3299	UH	T/Otter
Geraldton ONT	ATZ				NR	T/Otter
Gethsemani PQ					WS	T/Otter
Gods Narrow MAN				4800	UW	Beech
Gods River MAN					UW	Beech
Grand Forks BC				3927	PW	T/Otter
Holman Island NWT				604	NV	DC3
Hornepayne ONT					NR	T/Otter
Island Lake MAN	ATZ			11908	UL	Swearingen
Ivugivik PQ					UH	T/Otter
Kapuskasing ONT	CZ	Yes	498/1	15587	NR	T/Otter
Kegaska PQ					WS	Beaver
Kenora ONT	CZ	Yes	518/1½	18783	NR/UW	T/Otter/Beech
Kingston ONT	CZ	Yes	415/1	42048	WJ	Piper
Kirkland Lake ONT	ATZ				NR	T/Otter
La Tabatiere PQ					WS	Beaver
Little Grand Rapids MAN				962	UW	Beech
Masset BC					GD	Goose
Namu BC					MG	Mallard

Nanaimo BC	CZ/TT	Yes		38988	ZX	T/Otter
Norway House MAN	CZ		510/1½	7501	UW	Beech
Ocean Falls BC					MG	Mallard
Old Fort Bay PQ					WS	Beaver
Oxford House MAN				2978	UW	Beech
Paint Hills PQ					UH	T/Otter
Parry Sound ONT					UD	Beaver
Pelly Bay NWT			1146/3		NV	DC3
Pembrooke ONT			511/1½	12869	PD	Turbo Beech
Pickle Lake ONT	ATZ				UH/NR	T/Otter
Port Harrison PQ					UH	T/Otter
Port Menier PQ	ATZ		405/1		QB	Turbo Beech
Povungnituk PQ					UH	T/Otter
Powell River BC					PW	T/Otter
Powell Lake BC					ZX	T/Otter
Rainbow Lake ALTA				862	KI	T/Otter
Red Lake ONT	CZ		603/1½		NR/UW	T/Otter/ Swearingen
Rimouski PQ			658/1½	46837	HV	Cessna
Riviere Du Loup PQ	ATZ		755/1½	3934	HV	Cessna
Rupert House PQ					UH	T/Otter
St Augustin PQ					WS	Beaver
St Paul PQ					WS	Beaver
Sanikilvaq NWT			513/1½	1036	UH	T/Otter
Sans Souci ONT					UD	Beaver
Sherbrooke PQ		Yes	720/1	23978	QO	Turbo Beech
Sioux Lookout ONT	CZ	Yes	586/1	13505	UH	T/Otter
Spence Bay NWT					NV	DC3
Stewart BC					CD	Goose
Sugluk PQ					UH	T/Otter
Terrace Bay ONT	ATZ				NR	T/Otter
Tete a la Baleine PQ					WS	Beaver
Wawa ONT	ATZ			44544	NR	T/Otter

GLOSSARY - FOR APPENDICES B, C, AND D

TYPE OF ZONE

ATZ	-	aerodrome traffic zone
CZ	-	control zone
TT	-	temporary tower

AIRLINE

CD	-	Trans Provincial Airlines
CP	-	CP Air
EN	-	Air Caravane
GX	-	Great Lakes
HF	-	First Air
HV	-	Air Satellite
KI	-	Time Air
MG	-	West Coast Air Services
ND	-	Nordair
NK	-	Norcanair
NR	-	Norontair
NV	-	Northwest Territorial
OU	-	Air Atonabee
PD	-	Pem Air Ltd.
PV	-	Eastern Provincial
PW	-	Pacific Western
QB	-	Quebecair
QO	-	Bar Harbour Airlines
UD	-	Georgian Bay Airways
UH	-	Austin Airways
UW	-	Perimeter Airlines
WJ	-	Torontair
WS	-	Northern Wings
ZX	-	Airwest

It is to be noted that there is little traffic at some of the uncontrolled airports with scheduled air carrier operations, and a control tower, under such circumstances, would not be warranted. On the other hand, there are many uncontrolled airports with considerable traffic at which there are scheduled air carrier operations. Cranbrook with 34,512 movements, Peterborough with 49,369 and Kingston with 42,048 are examples of uncontrolled airports with scheduled air carrier operations which, on a relative basis, have considerable traffic.

It is also to be noted that many uncontrolled airports without scheduled air carrier operations have more traffic than some controlled airports with scheduled operations.

Mr. Livingston, in his brief, submitted that there should be an evaluation of all airports which have recorded 24,000 aircraft movements in the past three years as a determining factor for the commissioning of an air traffic control unit. The figure chosen by Mr. Livingston is obviously an arbitrary one, and I am in no position to pass upon its validity. However, the foregoing schedules do demonstrate the need, in my opinion, of new and revised criteria and of a re-evaluation of those airports which record substantial movement.

Apart from traffic, another factor which I think must be taken into consideration in the determination of whether a control tower is warranted is the size of the aircraft and the number of passengers being carried on scheduled air carrier operations. The mix of large jet aircraft with smaller slow aircraft at uncontrolled airports creates obvious hazards. Included in a re-evaluation, as I have noted, there should be a consideration of the nature of the aircraft, their size, speed, the number of passengers being transported in and out of uncontrolled airports and the mix of traffic.

The CATA guidelines referred to above do recognize that a tower may be necessary at a location which does not meet the basic traffic criterion. For example, a strong case was made out for a tower at Fort Nelson, which Appendix "A" disclosed had 29,710 movements in 1979. The traffic there is so extensive that the mandatory frequency which is used for communications between the Flight Service Specialists and the pilot is severely congested and nullifies the benefits of the mandatory frequency provisions which will be discussed hereafter. Following the submission of the evidence, the

Commission was advised that a tower at Fort Nelson will be commissioned in the fall of 1982. There are a number of other locations which should be examined to determine whether, notwithstanding the limited traffic, a tower is required.

Another such location is the airport at Sioux Lookout. Mr. Gordon Hill, former Chief Flying Instructor at Sioux Lookout Flying Club and now employed as a pilot for Central Air Transport, provided the Commission with a graphic description of the problem. Within four miles there are three licensed aerodromes. There is the land base, the water base in front of the town as well as a Natural Resources base about three miles south of the town. In the summer they are fairly busy. Many of the aircraft taking off or landing at these three facilities do not advise the flight service specialist, located at the land base, of their presence. The failure to do so may be due to the lack of a radio or failure to use a radio in the aircraft. Although the mandatory frequency guidelines are in effect, they do not seem to have solved the problems of separation of aircraft.

There are a number of other airports where the traffic does not meet the present guidelines, but special problems may require for their solution the installation of a control tower. It may be that after careful consideration of these problems in light of the improvements to the services provided at uncontrolled airports, which will be considered later, the Air Administration will decide against a control tower. Nonetheless, in the absence of evidence before the Commission that the Air Administration reviews in a systematic way these special cases, such a review should now be carried out.

Furthermore, I doubt that reducing service at those airports which are presently served by a control tower, with a view to saving the expense of operating them on a full-time basis is warranted. It is to be observed that the equipment is in place and operating throughout the period of time in which it is proposed that services be reduced. The overall savings would be minimal when weighed against the potential risk which the reduction in services would bring about.

In my opinion, therefore, the program to reduce service at those airports at which a control tower is presently in operation should not be resumed until the criteria for doing

so have been re-examined and re-appraised in consultation with the aviation community and local residents.

It is apparent, however, that having regard to the geography of Canada, its vast territories and limited population, we will continue to have to rely in great measure on the use of uncontrolled airports. In the interests of aviation safety, substantial improvements can be and must be made to the services provided at such uncontrolled airports, which will be dealt with later in this Report.

PART III

RADAR

PRESENT STATE

The present radar equipment in Canada, which has now been operating for over 20 years, is obsolete and, from a technological point of view, is presently about 20 years out of date.

Mr. John M. Belcher, Director of Telecom, compared the present state of radar to a 1958 car which can still operate and provide transportation if properly maintained.

The evidence disclosed, however, that at almost all the centres radar is out of service for a considerable part of the time. When there is a breakdown, the evidence disclosed that spare parts had to be ordered from Russia because of the age of the equipment presently in use. It is also not uncommon that equipment in service must be cannibalized to permit equipment to be taken from serviceable units to replace units which have broken down.

Since the radar in service is basically the same at all major airports, the instances of breakdown have been rather uniform. In addition, the equipment is faulty and will frequently throw up false images which, in the vernacular, are called "ghosts". It requires a special expertise on behalf of the air traffic controllers to properly diagnose that which is set forth on the radar screen.

Problems have been encountered at each of the major airports in varying degrees. I set forth hereunder a sampling of the evidence in this respect:

TORONTO INTERNATIONAL AIRPORT (MALTON)

At a meeting held in 1977 with the Administrator, the air traffic controllers at Toronto International Airport voiced serious concerns about the state of the radar equipment. A committee composed of senior management personnel and controllers was asked to

prepare a report. The report submitted to the Air Administration summarized their findings as follows:

> "The main problem on both radar systems are numerous target misses, severe strobing and ghosting. Government records do not give an accurate picture since 100 per cent of terminal/tower traffic, and approximately 20 to 30 per cent of Centre Traffic is off airways and government flight checks cover airways only. They also do not take into account ghosting, or second time targets. These are creating a hazardous situation. On a controller initiated survey covering a 29 day period from August 17 to September 14 there were 1048 radar irregularities, most of them being misses or ghosts. Even this figure will not be accurate due to the fact that these will only reflect slack times, when the controller has time to document them. It also does not reflect the effect that the misses, or ghosts, have on the actual operation. It was recognized 7 years ago that ghosting is being caused by new buildings, specifically the CP and AC hangars. It has taken that long to try to rectify the Centre's problem by installing an antenna at Caledon. We still do not have the antenna on line. Nothing has been done, to our knowledge, to correct the terminal/tower radar problem."
> (Emphasis added.)

The report concluded as follows:

> "In conclusion, in the last 10 years, IFR traffic in Toronto has increased by 60 per cent, Tower Traffic by 20 per cent, aircraft have increased in size and speed, have had equipment updates, such as INS, while the Centre/Terminal/Tower has had no appreciable update in equipment. Radars are 15 years old and hard to maintain and are not adequate. . . ."
> (Emphasis added.)

Mr. Wayne Barry, a senior controller at Toronto International Airport, while giving evidence before the Commission, stated that the situation had not changed apart from a brief attempt to commission the Caledon radar.

In October of 1979 there was a special study carried out by an ATS Evaluation Team. Mr. H. D. Buchanan, one of its members, and an ATS Headquarters specialist, stated that Toronto radar was the worst radar he had ever seen in his life. As a result, a report was prepared by a team composed of Messrs. P. A. MacLennan and Roy Conibear employed by ATS and TAR (Radar and Automation) respectively. A number of recommendations were made, but were characterized by Mr. George Wakelin, the Ontario Region Communications Specialist employed by Telecom, as band-aid treatment. In his

comments on this report contained in a memorandum of November 2, 1979, Mr. Wakelin said in part:

> "We are dismayed at the HQ report and find little if anything useful in it. The real problems at TIA with the Radar Systems is old equipment sited in a poor Radar environment. Band Aid treatment is of little or no use. It was stated by P. McLennan that the Radar at TIA was that same radar as he had always known no worse no better; if this is the case why all the recommendations?
>
> If HQ are really serious about improving radar performance, we would suggest emergency purchase of 'off the shelf' SSR systems with the Monopulse feature. We could then cure most of our SSR problems within the next year or so. Modifications to the present systems, unless elaborate and costly, will be of little use."
> (Emphasis added.)

The Toronto Air Traffic Controllers prepared a report on the interruptions in the Toronto radar during the month of August, 1980. During that month there were a total of 191 interruptions. With respect to the enroute radar ASR-5, there were 45 such outages ranging from less than half an hour to seven hours, during which time the radar was not operating.

QUEBEC CITY AIRPORT

During its Quebec hearings, the Commission heard from Mr. Serge Dorion, an air traffic controller with ten years' experience. He testified on the subject of radio and radar breakdowns at the Quebec City airport and filed as an exhibit the following report:

"REPORT ON RADAR AND RADIO BREAKDOWNS

(Legend: TCU = Tower Control Unit
RDO = Radio
RDR = Radar)

1976	TCU	TOWER
February	RDO 25	RDO 49
March	RDO 44	RDO 26
April	RDO 10	RDO 19
May	RDO 21	RDO 9
June	RDO 20	RDO 22
July	RDO 20	RDO 20

August		?		
September		RDO 23		RDO 29
October		RDO 27		RDO 32
November		RDO 18		RDO 33
December		RDO 33		RDO 46

1977	TCU		TOWER	
January		RDO 21		RDO 34
February		RDO 21		RDO 33
March	RDR 46	RDO 28	RDR 6	RDO 51
April	RDR 38	RDO 20	RDR 13	RDO 53
May	RDR 56	RDO 12	RDR 16	RDO 44
June		RDO 20		RDO 30
July	''	RDO 9		RDO 68
August		RDO 18		RDO 44
September		RDO 17		RDO 11

1978	TCU		TOWER	
February		RDO ?		RDO 35
June		RDO 19		RDO ?
August		RDO ?		RDO 8
September		RDO ?		RDO 16
October	RDR 39	RDO 4	RDR 11	RDO 10
November	RDR ?	RDO 3	RDR 3	RDO 17
December	RDR 35	RDO 7	RDR 4	RDO 16

1979	TCU		TOWER	
January	RDR 28	RDO 7	RDR 4	RDO 12
February	RDR ?	RDO 8	RDR ?	RDO 10
November	RDR 40	RDO ?	RDR 1	RDO ?
December	RDR 17	RDO 8?	RDR 4	RDO 9?

1980	TCU		TOWER	
January	RDR 24	RDO 10	RDR 10	RDO 9
February	RDR 19	RDO 9	RDR 13	RDO 15
March	RDR 16	RDO 9	RDR 17	RDO 11
April	RDR 33	RDO 6	RDR 17	RDO 21
May	RDR 17	RDO 13	RDR 4	RDO 13"

(+)
(Where there are no figures, this indicates that the numbers are unavailable).

For the purpose of the report, a breakdown lasted anywhere from 10 minutes to 12 hours.

The Quebec airport has two runways, one of which serves as a taxiway so that only one runway is used at any one time. In Quebec City, traffic arrives from the south because of the presence of a mountain range to the north of the airport. In other words, visual flight and instrument flight traffic all arrive from the same direction and radar thus plays a particularly important role in traffic separation.

Mr. Dorion described the sensation felt by air traffic controllers when there was a radar breakdown as one of "panic". The same sensation resulted from a radio breakdown.

It is to be noted that in May 1977, the terminal control unit at Quebec airport had 56 radar breakdowns and 12 radio breakdowns. The control tower suffered 16 radar breakdowns and 44 radio breakdowns.

There were 128 breakdowns at the Quebec airport during the month of May 1977. In January 1980 there were 58 breakdowns; in February, 57 breakdowns; in March, 53 breakdowns; in April, 77 breakdowns; and in May, 57 breakdowns.

MONTREAL INTERNATIONAL AIRPORT (DORVAL)

The evidence that was submitted to the Commission with respect to the state of the radar equipment at the International Airport at Dorval disclosed that the conditions were similar to those which exist at Malton and Quebec City. In addition to the outages, considerable evidence was led as to the unsatisfactory state of the equipment. Mr. Paul Bibeau, a senior controller at Dorval, gave evidence in rather a dramatic fashion as to the false images portrayed on the radar screen. He stated that "ghosts" were frequent, and it was often not possible to distinguish between an aircraft and a barn. As a result of complaints from the controllers that the targets were breaking up on display, the ASR-5 secondary surveillance radar at Dorval was shut down in October, 1979. While this equipment was shut down, primary radar was used in an attempt to perform the function of the ASR-5. This proved unsatisfactory, and the following NOTAM was issued in November, 1979:

"790946 NOTAM CYUL MONTREAL
Due to the poor quality of primary radar within the terminal area ATC may not be able to exchange traffic information. Consequently pilots are urged to be even more vigilant on their scanning technique for VRF traffic. Furthermore slight delays for IFR flts may be encountered due to the type of radar in use. In addition VFR ACFT not equipped with transponder are not authorized within the Montreal TRSA without prior approval."
(Emphasis added.)

The situation was summed up in a telex from the Montreal Airlines Operators Committee dated February 21, 1980 as follows:

"The Montreal Air Operators Committee in Montreal International Airport, Dorval; is extremely concerned with the serious delays of up to two hours to all flight operations at Dorval Airport, such delays being caused by the ASR-5 being out of service for several months. The enroute radar AASR-1 is not properly calibrated and the employees are refusing to use this equipment as it is not fully reliable. Our Committee request immediate and corrective action and would appreciate knowing the measures being taken to rectify this situation."
(Emphasis added.)

In February of 1980, the ASR-5 equipment, which was not scheduled to be returned to service until November 30, 1980, was pressed back into service. When asked what was done to remedy the previous defects in the ASR-5, Mr. Trevor G. Paine replied as follows:

"I don't think one could put one's finger on a fix as such. There were several things wrong. It was a very much trial and error situation. We changed the SSR antenna and we put a new antenna up, the problem persisted. We looked at the signal strengths, the static when it was rotating; we tried various technical things that I am quite sure that the engineers would be able to answer in greater detail. . . ."

Notwi.hstanding this remedial work according to the weight of the evidence from the controllers, the equipment remained the same.

TORONTO INTERNATIONAL AIRPORT
JULY 28, 1980, 7:00 P.M. - ELECTRICAL BLACKOUT

On July 28, 1980 at approximately 7:00 p.m. every radar console, TV screen, frequency light, and every electronic agency and piece of equipment went dead. While there was a

considerable amount of very technical evidence as to the cause, it is sufficent for my present purposes to state that it was due to a lightning strike.

At the time of the blackout there were approximately 30 aircraft at various stages of approach to the Toronto International Airport and dependent on the air traffic controllers for separation and landing. What happened thereafter is described by Mr. Stanley Roy, a radar terminal controller handling arrivals and departures. When the radar went dead, he immediately turned, as did other controllers, to a battery powered standby radio. This is a small aircraft radio modified to be used with AC or batteries. These Bendix emergency transceivers are only used as the last backup. Unfortunately, with four of these radios operating, it was to use the words of Mr. Roy, "the same as a CB would be on a Friday night. Every time you try to say something, you could hear part of what an aircraft on another frequency and part of what the other controllers were saying". With this degree of interference it took what seemed to Mr. Roy to be ten minutes before the confusion was brought under control. It was necessary to require the aircraft to increase their distances from each other. What is a safe distance when radar is operating is not a safe distance when the system of procedural control is being used. As I pointed out earlier, in the absence of radar, separation between aircraft must be based on time, distance, speed and altitude computations. The separation required under such procedures was said to be approximately ten times that required under a radar condition and, therefore, less efficient.

Eventually things settled down, and due to the commendable calm and efficiency of the controllers, all aircraft were either landed safely or passed off to another airport. The period of transition, however, was summed up by Mr. Roy in the following exchange:

> "(Sopinka) Q . . . Was there any panic?
>
> (Roy) A Well, the definition of 'panic'; it's got a few different meanings. There weren't any people going in an ever-tightening circle so they disappeared or anything. The definition of ATC is hours of routine boredom with moments of stark terror. It was a long moment of stark terror for a while. A person who panics wouldn't last very long."

The evidence showed that while there are attempts to train controllers to make the transition from radar to procedural control, the only meaningful training is when the

radar actually fails. The difficulty was pointed out in the examination by Mr. Livingston of Mr. Roy in the following passage:

> "(Livingston) Q I am trying to clarify that a little more. I am not suggesting that the ability to apply the procedural separation -- I am suggesting, at least in my mind, it's very difficult to provide a controller with a set of procedures to convert from radar separation to procedural separation.
>
> (Roy) A Oh, I understand that. No. Every situation is different and it's different every ten, twenty seconds because you think, in the initial stage, that you have found the positioning of all your aircraft and, as you double-check, there may be something different in there. You cannot put down a procedure to go from radar to standard except what was done; you establish all the positions, all the altitudes and make the changes as necessary and, once everything is separated by whatever standard you are using, then you go into the standard separation and start working towards an end."

It should be observed that after Mr. Roy had given his evidence, the Commission was advised that the problem with respect to the jamming of the radios has been corrected by relocating the antennas for the Bendix receivers to the furthest point on the roof of the air traffic control centre and an additional backup described as a "hot backup" has been provided.

A total failure of all radar in the situation such as occurred on July 28 at Toronto International Airport is rare. There was, however, an abundance of evidence of lesser failures at major airports and of failure of radar to function as it should. The evidence disclosed that although the occasions upon which there have been failures of radar because of the state of the equipment for varying periods of time are numerous, there has been little attention given to the training of air traffic controllers as to the proper procedures to be taken to revert from their dependence on radar to a procedural form of separation when radar equipment is for some reason not in service.

REASONS FOR BLACKOUT

In a report prepared by Mr. D. W. Pratt, employed in the Aircraft Facilities Branch of the Airport Directorate, on August 13, 1980, the following conclusion is drawn:

".1 A lightning strike at the Tower caused a voltage surge in the line feeding the ASR5. This would have been caused by induction due to a heavy lightning discharge current in the Tower area. As a result, the 15 KVA transformer at the ASR5 shorted to ground, causing a high fault current due to both normal supply plus the current arising from the lightning surge. Under these circumstances, lightning induced current can circulate in a 'ground loop'.

.2 The co-ordination of the circuit breakers between the SUPU and the ASR5 is not satisfactory. When the fault occurred at the ASR5 transformer, No. 1 on Diagram Appendix A, the 100 A. breaker at the ASR5 (No. 2) opened, but could not extinguish the arc due to both normal supply plus lightning fault current. At this point, the 150 amp breaker in panel 'A' (No. 5) should have tripped, disconnecting the ASR5 only. Instead, the main 600 amp breaker ACB-1 (No. 3) tripped, disconnecting all essential loads supplied by Panel 'A' including the ASR5, Control Tower, and IFR radio.

.3 The existing power supply to the ASR5 has poor reliability due to the long cable run and large number of components between the SUPU and the ASR5. The components and cable are subject to failures, damage due to construction, lightning surges, etc."

Mr. Norman F. Hall, Mr. Pratt's superior, elaborated on the findings of the report. He explained that the transformer itself was not struck, but that the electrical current generated by lightning passed through the transformer causing it to fail. Due to a lack of coordination of the circuit breakers all power was lost to the control tower. The Static Uninterruptible Power Unit (SUPU), which is battery powered so as to provide a source of power independent of hydro power, was situated three quarters of a kilometre from the ASR5 radar equipment. Transport Canada's standards provide as follows in AK-64-06-002 of the Electrical Manual:

> "The UPU output feeder length should be minimized for optimum reliability. It is preferable that this feeder length be less than 125 m and within limits which preclude the necessity for step-up and step-down transformers for voltage regulation improvement."
> (Emphasis added.)

This departure from standards was well known and had been the subject of at least one previous report. That report prepared by Telecom in 1977 observed:

> "The power interruption occurred to the ASR-5 radar at Toronto on July 31, 1977 and radar service was provided to ATS on a continuing basis by selecting the AASR-1 for terminal control.

The ASR-5 and AASR-1 radars at Toronto are presently fed from the RUPU at the AASR-1 site and while the RUPU functioned normally at this time, a lightning strike affected buried power cables carrying power into the ASR-5 building. The radar would only have operated if it had its own SUPU co-located. A 60 KW SUPU was purchased for Toronto airport in 1974/75, it was stored until July 1977 when the Region started to install it at Caledon. They now plan to feed the ASR-5 from the control tower SUPU and cabling is presently being installed. If power cable troubles develop in the future, you can expect radar outages again. KFUE advise that problems associated with a remote SUPU were discussed with the Region.

The Region claims the radar will be served by a SUPU, (remoted a half mile away), however, this is false security. The original intent was to co-locate SUPUs and radars so that if power failed, the SUPU would continue to supply power for a fixed period of time."
(Emphasis added.)

A memo dated August 7, 1980 from Mr. R. B. Glass to the Director of the Electrical Section of Airports pointed out that other airports are in breach of the standards as follows:

"Uninterruptible Power Supply - Reliability

The recent power failure at Toronto International Airport has drawn to our attention that there exists potential problems at several other sites due to long cable runs between the SUPUs and their respective loads. These installations were made some years ago and, at that time, Regions were reluctant to install additional SUPUs adjacent to their loads due to the costs involved.

An attached copy of an excerpt from AK-64-06-002 contains the guideline recommending the cable length be limited to 125 m (400 ft). This guideline has been in existence since 1972.

The following sites have feeder lengths in excess of that recommended:

Moncton	803 Radar	8,000 ft
Toronto	ASR-5 Radar	3,000 ft
Sault Ste. Marie	TCU	2,500 ft

(the continuance of the radar and TCU at Sault Ste. Marie is still being questioned within DGCA).

Edmonton	TCU	800 ft.

Our present practice is to locate a SUPU and supporting IFU adjacent to the load to provide maximum reliability.

To correct the deficiencies at the above sites would require funds and programming. However, it has been the practice for DTA/A to fund the

initial installations and also the major maintenance items. They (TARS/A) are also aware of these deficiencies and may take action to insert projects into the capital program.

With your approval, we will officially advise DTA/A of these deficiencies." (Emphasis added.)

It would appear from the report that the distance of the SUPU from the ASR5 was a cause of the total failure of power. This conclusion was confirmed by Mr. Hall. He explained, however, that even if the SUPU had been collocated, the effect would have been the same. Although the ASR5 would have had power, the information generated by it would not have been available to the controllers since there was no power to operate the receiving equipment and the screens would have remained blank. Thus while the breach of standards was a cause of the failure of the SUPU, the breach was not a material cause of the blackout. The following passage from the evidence of Mr. Hall is pertinent:

"MR. COMMISSIONER: If it had been located where it was recommended that it be located then there would not have been a total loss of power?

THE WITNESS: Not a total loss of power but the effect would have been the same if you think about it. Because the breakers did not operate the way they went and the control tower was shut off. So the radar would send information back to blank screens."

Mr. Edwin Warrick, the Acting Director of Airport Facilities Branch and Mr. Hall's immediate superior, confirmed this conclusion.

It is, nevertheless, apparent that due to a non-compliance with its own standards, the Air Administration has compromised the SUPU as an independent source of power. By reason of the distant location from the ASR5, its operation is affected by the operation of the hydro system. When the hydro system circuit breaker failed to function, the SUPU was also put out of commission. The objective in providing a SUPU is to have an independent source of power, and this is not being achieved because of the location of many of the Static Uninterruptible Power Units.

Mr. Warrick assured the Commission that the sites at which SUPUs do not comply with the guidelines will be corrected. It is important that this assurance be carried into action.

THE RADAR MODERNIZATION PROGRAM (RAMP)

It has been apparent for many years that the radar equipment presently in use in Canada is obsolete and has outlived its life expectancy. As has been noted, there have been severe outages in most of the airports in Canada on many occasions, and when the equipment needs repair, there is a shortage of parts. Even when in operation our present radar facilities are technologically antiquated.

This situation was recognized for many years by senior management of the Air Administration, and yet it is only of relatively recent date that a program was instituted for the replacement of the present radar facilities. The program for the replacement of this obsolete equipment is known as the Radar Modernization Program (RAMP) which formally began in 1978 or 1979. It is a present prediction that this plan will result in the delivery of new equipment some time between 1984 and 1990. The question immediately arises as to why the RAMP program was not started until the existing equipment was manifestly demonstrating the deficiencies inherent in its obsolescence which clearly could have been anticipated.

The further question arises as to why the RAMP program is taking so long. There was obviously a failure in attacking this major program earlier and more efficiently. The delay in the RAMP program was the subject of considerable evidence before the Commission. Many of the witnesses attributed the lack of planning to overcompartmentalization of what should be essentially one unit which provides air navigation services. The planning is somewhat removed and divorced from those who will have to execute the plan and from those who are the users of the system.

The main participants in the RAMP program are Telecom and Air Traffic Services and to a lesser degree Airways. The organizational structure is such that these agencies work independently and from different points of view. Telecom might be described as the engineering side whereas ATS are the controllers and the users. Their different points of view are promoted and accentuated by the fact that they report to different directors. This problem was identified in an Operations Review entitled "Management of the Air Navigation System, February 1979" which under the heading "Chapter IV, Policies, Procedures, Standards and Operations" made this observation:

"The independence of ATS and T & E Manuals of Operation is a cause for concern in some areas, as indicated earlier. The approval level of these documents is a concern for some in DSL and a certain lack of procedural conformity in overlapping areas of responsibility and interface with the industry does appear to be a concern for some.

Both Telecommunications and ATS have separate elements involved in the process of procedures development - TAFO and ATP; in DLI there is LIOA. Each group works independently in establishing procedures according to their functional responsibilities with little cross-fertilization of information or consultation."

And in another part of the report the Review asked the following questions:

"<u>How can the operational procedures of both ATS and T & E be complementary when they are developed by two separate operating agencies working independently with divergent degrees of operation decentralization</u>?" (Emphasis added.)

The RAMP program was officially commenced by the delivery of a document TP2085 in May 1979, but since then very little progress has been made. The explanation offered by Telecom is that TP2085 did not provide sufficient details and that these were not provided until September 1980. Mr. Belcher testified that "you can't finalize a program until you have those". Immediately after this evidence was given by Mr. Belcher, the Director of Telecom, Mr. Pierre J. Proulx, the Director of ATS, countered as follows:

"(Sopinka) Q Well, then, Mr. Proulx, what took you so long to get the final operational requirements?

(Proulx) A The operational requirements were submitted in the document TP2085. Those operational requirements, as far as the ATS branch is concerned, have not changed. What happened is that a consultation process to explain the contents of those 13 pages should have taken place almost immediately. The last document that we have submitted, which is the one on September --

MR. COMMISSIONER: 1980."

It was not until May of 1981 that the Air Traffic Services Operational Performance Requirements for Primary and Secondary Surveillance Radar and Display Systems was finalized.

It appears to be common knowledge in the Air Administration that the delay in the last two or three years with respect to RAMP has been due to mutual recriminations between ATS and Telecom. Mr. George Wakelin, Ontario Region Communications Specialist employed by the Telecom Branch, put it this way:

> "(Fleming) Q No, I understand there is also a second side of the story to explain the delay between '69 and '80. What is that?
>
> (Wakelin) A I don't know going back as far as 1969, but I understand in the last two or three years ATS are accusing Telecom of re-inventing the wheel and thrusting unwanted systems on them and things like that. But that again, these are things I have heard from ATS and from Telecom.
>
> . . .
>
> (Wakelin) A I can only guess. It's off the top of my head, obviously, if the relationship isn't good it would be very, very difficult to come up with a concerted plan."

Telecom drafted a specification called TAR5905 which was submitted to industry. It was apparent to Mr. Paine, and to a number of companies which had responded to the circulation of this specification, that Telecom was directing the contract for the supply of the equipment to one company, referred to in the evidence as X company. This company had apparently proposed that the old hardware which it had supplied be retained, but that the electronics be replaced with new solid state electronics. Mr. Paine, on behalf of ATC, found both the directed contract idea and the use of existing hardware unacceptable. He was supported in respect of the latter contention by a report from an independent agency outside of the Air Administration. Apparently Mr. Paine was so vehement in his disagreement that he was removed from a committee which was set up to deal with the matter because of emotional outbreaks between the two branches.

This standoff continued until a meeting of October 14, 1980 attended by senior officials of both branches. It was decided to go to an open tender concept. Apparently this will not rule out the possibility of buying off-the-shelf equipment. Meanwhile, however, valuable time was wasted by reason of the inter-branch rivalry and lack of communication.

<u>THE JOINT ENROUTE TERMINAL SYSTEM (JETS)</u>

The Joint Enroute Terminal System is a radar remoting processing and display system which is presently in place at Moncton and at Toronto International Airport and is intended to be installed at each of the seven Canadian area control centres. Under this program the existing radar is not replaced. Its use, however, is expanded, and the range of information displayed to the controller is increased. It provides the controller with some additional radar displays and also provides a printout on the display screen of the aircraft's identification, altitude and ground speed. It only identifies aircraft which are transponder equipped. The information is then relayed from local radars via cable and microwave links and from remote radars via data circuits provided by Trans Canada Telephone System. Aircraft without transponders are still subject to primary radar surveillance with its limitations. However, the identification of such aircraft is made more difficult than heretofore when displayed on the one screen in conjunction with the identification of transponder equipped aircraft.

The Joint Enroute Terminal System was designed in-house and the commissioning of the joint enroute terminal system was delayed for many years. There was other equipment that was already designed with a proven track record that could have been purchased and installed much faster than the JETS.

Mr. Alfred C. Fisher, CATCA Chairman of the Joint CATCA DOT technical team established to discuss new equipment, said:

> ". . . <u>we were supposed to have an automated air traffic control system in the year 1974. This was talked of in 1968. The intent at that time was to buy equipment off the shelf that was available. It is now 1980, we have one unit operational in JETS so far</u>. . . ."
> (Emphasis added.)

Mr. Proulx admitted that he prefers "a fly before you buy" approach, and his evidence in this respect is set out below:

> "(Proulx) A I understood, in talking to some of the people who were involved with the company who manufactured ARTS 3, that when they bid they understood our technical specifications and they felt that they could

meet the operational requirements. Although we did not go that way, I think that at that time the system would have been on line a lot quicker than 1980, which was the first system, in April, 1980, in Moncton. From that to us we could now be bringing enhancements probably to the system, we would have had the experience with that new system and it would meet this compatibility although you can make the systems compatible.

I think that to us, in Air Traffic Control, we are getting into 1980 with a JETS that will probably have to start modifying almost immediately, bring enhancements or replacements to JETS because we expected the system in 1974. It is reflected in the minutes of meetings, it's going to be here, it's going to be two weeks late next year and it's 1980 when we get the first system. So there are some difficulties, I think, in the development of JETS, the expertise in building a system of that size was not resident in Canada. And that is why it took so long to get the system.

(Sopinka) Q That's an argument for buying it off the shelf, you would get it in quicker and it is not obsolete when you install it, isn't it?

(Proulx) A That's correct."
(Emphasis added.)

In the brief presented by the Canadian Air Traffic Control Association, Inc., the controllers complained that the system was designed and purchased by Telecom without sufficient input from ATS. They also testified as to many technical deficiencies inherent in the current JETS. Mr. J. Michael Tonner, former air traffic controller, now the DATA Systems Coordinator for Gander, Newfoundland, gave particulars of some of the technical deficiencies. He was a very impressive witness and, obviously, a controller with great expertise. He cited some of the particular problems as follows:

". . . Throughout our years of consultation with the Department of Transport we feel we have been misled as to the capabilities of the product we are receiving. We are now witnessing with the first installation a manifestation of those fears and undoubtedly more will surface with future installations. There are both safety related and efficiency problems with JETS. On the efficiency side the system does basically little more than our present radar display system except that it will provide the controller with some additional radar displays. It will also provide the controller with a print out on the display screen of the aircraft identification, altitude and ground speed. Aside from these features there is little change from our present equipment. Although this sounds impressive the technology is 20 to 30 years old. In addition to not being compatible with United States equipment, the system is presently not even able to exchange data from one Canadian Centre to the other. The effect of both of these inadequacies is that the controller is not relieved of the time consuming task of manually passing data information via telephone from one centre to another. This task consumes a large part of the

> controller's time. If he were free of it he would have more time to devote to the separation of aircraft. The system also does not possess state-of-the-art enhancements such as a conflict alert or warning to advise controllers of pending possible collisions between aircraft. Nor does it provide us with the feature of low altitude alert, or minimum safe altitude warning, so that a controller can alert a pilot if he descends dangerously close to the ground.
>
> On the safety side there are failures of the system that can occur of which the controller will not be aware. First, he will not have any indication of the failure; and secondly, the display will still continue to indicate as though it were a functioning system. . . ."
> (Emphasis added.)

The Electronic Systems Specialists, who are involved in the design, construction, installation, inspection, maintenance and repair of electronic equipment for Transport Canada, submitted a brief stating that they:

> ". . . consider the JETS a reasonably successful venture from a technical point of view.
>
> This is not to say, that the project went ahead smoothly. It has been suggested to me that the JETS is a classic example of Project Management, MOT style."
> (Emphasis added.)

They listed problems which they said could contribute to unsafe operating conditions, including lack of spares, test equipment manuals and performance specifications for maintenance.

The Canadian Owners and Pilots Association submitted the following:

> "COPA considers that DOT should have chosen the U.S. automated air traffic control system to handle high density air traffic on a computerized basis rather than develop Canada's own. The U.S. system was well proven. COPA reasons that with so much transborder air traffic, safety is enhanced when systems are 100% compatible in each country."
> (Emphasis added.)

Nevertheless, there is evidence that the United States system would not have satisfied Canadian requirements without considerable modification. Theirs is a terminal system whereas JETS include both enroute and terminal radar.

Mr. Walter M. McLeish very fairly summarized the reason for the manner in which the JETS were developed as follows:

> ". . . The fact of the matter is once we have established the specification we then have to examine other government objectives, and these are in fact being sponsored and safeguarded by other departments under the mandate of other Ministers and members of the Cabinet. It inevitably comes down to the fact that we sit in an interdepartmental committee and we attempt to explain why a specific operational requirement leads to a specification and that nothing less than that will suit our needs. <u>But there are also other government objectives with respect to Canadian content, with respect to regional development, and these are all placed before us and eventually we try to find a compromise that does not compromise the satisfaction of the operational requirements</u>.
>
> <u>During the JETS exercise we learned a great deal. That was the first time we faced up to this problem on a major purchase, and we could have done a better job. Some of the points that we failed to make at that time led in due course to the delays in the implementation of the JETS program. We didn't have the prescience to anticipate all the problems</u>.
>
> . . .
>
> I sincerely hope that our desires to have the optimum system will prevail, and if they do then our successors won't have to appear before another Safety Commission in the years ahead to explain what went wrong."
> (Emphasis added.)

<u>COMMENT</u>

Little is to be gained by further detailing flaws in the Joint Enroute Terminal System which is now in place. Steps are now being taken to improve upon it and to eliminate many of the problems which were apparent upon its being commissioned into the system. Those steps are meeting with some success.

However, the development of the Joint Enroute Terminal System brings into serious question the advisability of proceeding in future with in-house design of radar equipment. The progress of the technology throughout the world in this area is so rapid that new equipment becomes obsolete almost at the time of its installation. There is no "off-the-shelf" equipment as such, but there is modern equipment made elsewhere which can be purchased on order which, at least at the time of purchase, has a proven and demonstrated record.

The commissioning of the Joint Enroute Terminal System from its initial design stage took many years before its installation, and because it had been previously untried, it could only have been anticipated that there would be flaws. Since it took so long before the equipment could be used, it has already fallen behind the state of the art in other jurisdictions. It is also no reflection on the employees of the Air Administration to recognize the greater expertise elsewhere of those in this particular field.

As a result of the many submissions made to me, I am satisfied that in future it would be far more preferable to approach the acquisition of new equipment on the basis of "a fly before you buy" approach.

Mr. McLeish, quite properly, pointed out that the purchases of such magnitude must also conform with government objectives which would favour a made in Canada product. Accommodation can be made to this policy by acquiring equipment designed and tested elsewhere with the input of proven Canadian expertise in the manufacture of such equipment.

As I have already observed, the radar equipment presently in use in Canada is obsolete and is not functioning adequately. The replacement of this obsolete equipment has, I think, been unduly delayed by inadequate planning. It is difficult to understand why it has taken so long to put in place a Radar Modernization Program.

By reason of the dramatic technological changes in this scientific field, it is incumbent on those, who have the responsibility, to have an effective plan in place which can be immediately implemented to meet the changing demands. In my opinion the delay in the Radar Modernization Program can be partly attributed to the structure of the organization of CATA itself, and the division of authority and personnel, which matter will be subsequently discussed. The present organization and cumbersome planning procedures appear to be an impediment to timely and effective action.

The highest priority, obviously, must now be given to the Radar Modernization Program, and every effort must be made to implement it.

With the introduction of the Joint Enroute Terminal System, a serious question arises as to whether non-transponder aircraft can be safely accommodated at our major airports which are or will be serviced by such a system. As inconvenient as I think it may be to those in general aviation, it is apparent that there must now be some limitation on the availability of our major airports to non-transponder aircraft when the airports are operating at peak periods.

PART IV

TERMINATION OF KENORA PRIMARY RADAR

INTRODUCTION

During the course of the Inquiry considerable evidence was led relating to the decision of Transport Canada to terminate the primary radar facilities at the Kenora Airport.

The primary surveillance radar (PSR) at Kenora, Ontario, was originally commissioned for operational use in July 1960. It was installed to fill a gap in the radar coverage between Winnipeg and the Lakehead. This gap complicated and made inefficient the control of traffic between these two sites. The traffic consisted largely of CF-100s and T-33s of the Canadian Forces and jets departing from Winnipeg eastbound and from the Lakehead westbound. The type of primary system installed was an AASR-1. Inasmuch as there was no effective method of relaying the information from this radar via a landline (remoting) back to Winnipeg, a traffic control unit was established at Kenora which served as "an outlying Kenora sector" of the Winnipeg Area Control Centre. In 1964 a secondary surveillance radar (SSR) was added to the system. At present, this unit continues to function as an outlying Kenora sector of the Winnipeg Area Control Centre.

The effective maximum range of the AASR-1 is about 160 nautical miles in radius and depends on the size and operating altitude of the aircraft for any response. Radar waves do not follow the curvature of the earth, hence the farther away an aircraft is from the transmitter, the higher the aircraft must be to receive radar coverage. For example, at Sioux Lookout which is about 100 nautical miles from Kenora, the minimum radar altitude for the AASR-1 is approximately 7000 feet. The effective range of the SSR at Kenora is limited to about a radius of 200 nautical miles and, as was noted, this system detects only aircraft having functioning transponders.

While initially the primary radar at Kenora was designed as an aid to enroute aircraft in order to fill the gap in coverage between Winnipeg and the Lakehead, it has come to serve other purposes as follows:

(a) as a back-up to the SSR system which permits the continued safe flow of air traffic during periods of SSR maintenance or unserviceability;

(b) as a navigational aid to those aircraft which do not have a transponder or a transponder which is not operating; (According to the evidence, it is estimated that one out of every five VFR aircraft may have transponders.)

(c) to detect hazardous weather conditions in order to provide pilots with this valuable information;

(d) to assist disoriented pilots and to locate lost aircraft.

DOT PROPOSAL TO TERMINATE KENORA PRIMARY RADAR

In May 1979, Transport Canada officials completed a national plan for the replacement or provision of radar systems at all locations. In this connection, systems across the country were examined and subjected to criteria developed as part of this RAMP program in order to determine whether or not traffic and other conditions warranted replacement of the existing facilities with new facilities. Kenora was one of the sites subjected to this test and when it failed to satisfy the criteria, it was determined that the primary radar would be dismantled. The secondary radar system is to be moved to Dryden whence its information will be remoted to Winnipeg. There will be no controller at Dryden. There would, however, continue to be a Transport Canada presence in the person of technicians who service the equipment.

The principal reason for the decision to terminate Kenora primary radar was the application of the criteria which were developed in connection with the RAMP program. This involves a complicated formula that was developed by the FAA in the United States. The subject site is initially screened on the basis of two factors, traffic density and traffic complexity. These are described in the DOT brief as follows:

"Traffic Density

Unless airports met the following criteria, they were considered insufficiently busy to warrant further consideration: The traffic must equal either at least 45,000 annual itinerent movements, or at least 4,000 annual air carrier operations, or at least 18,000 annual IFR operations.

Traffic Complexity

The airport then had to satisfy any combination of the following three criteria with respect to both the major and satellite airports:

a. 45,000 annual itinerant operations, of which 10,000 are air carrier operations and 18,000 are IFR operations.

b. 105,000 annual itinerant operations, of which 4,000 are air carrier operations and 27,000 are IFR operations.

c. Annual itinerant operations 145,000 - (10 x air carrier)
and
IFR operations 33,000 - (1.5 x air carrier)

If the site under consideration qualified under these Traffic Density and Complexity criteria, it was considered further."

In the figures being used by Transport Canada, Kenora qualified for further consideration with respect to traffic density, but failed to qualify for further consideration under the traffic complexity criterion. Nevertheless, because of the contentious issues raised, Kenora was subjected to the benefit cost calculations which ordinarily apply to a site which passes both screening tests. The benefit cost formula is explained as follows in the DOT brief:

"Costs

Costs for typical installations were calculated by the Telecommunications and Electronics (Air) Branch. For a site like Kenora, the costs calculated were:

Annual Capital Cost (over 15 years)	$116,810
Installation Cost (over 15 years)	24,000
Annual Maintenance Costs	101,734
Cost of Flight Checking	5,000
Controllers (5 x 2.29 x 22,000)	251,900
Total Annual Cost	$499,440

Benefits

User savings were calculated based on findings that the use of radar reduces flying time per itinerant operation by about 2 minutes. The savings accruing from this reduced operational time per flight was calculated as $800 per air carrier operation and $100 per general aviation operation. These savings were calculated by multiplying these figures by the number of actual and forecast operations for each category.

Factors such as the 2 minutes saving per itinerant operation, the class of aircraft involved, the risk of collision expected, collision cost per category and preventable mid-air collision value was combined to derive the safety benefit. It is interesting to note that a study of 571 mid-air collisions concluded that, in the traffic density, mixture and complexity around Kenora, radar traffic advisory would have assisted in preventing only 1.0% of the preventable mid-air collisions.

To allow for other benefits, 20% of the sub-totalled user savings and safety benefits was added in. This was to fairly quantify benefits which would accrue from the reduction of human stress, weather advisory service, improved enroute surveillance capability, flight advisory and traffic information services, recovery of lost aircraft, etc.

Benefit/Cost Ratio

The total annual savings were then divided by the total annual costs and compared to 1 to obtain the benefit cost ratio. If the benefit-cost ratio was equal to or greater than 1 as compared to 1, the site was ranked along with the other qualifying sites in descending order of this ratio."

The benefit cost ratio for Kenora on the figures presented to the Commission for 1977 was 0.259:1 and, accordingly, it was determined that Kenora did not qualify.

As a result of the cross-examination of Mr. Trevor Paine who presented the brief on behalf of the Air Administration, these figures were revised by him. Traffic figures were increased from 7,751 to 35,647 total itinerant movements in 1977. The cost figures were substantially reduced, and the revised benefit cost ratio has been changed to .61:1.

CRITIQUE OF DOT PROPOSAL

It was submitted that the screening criteria are designed to select those airports at which the equipment is justified on the basis of their need in order to separate arriving and departing aircraft. Those who support retention of Kenora radar do not do so on this

basis, but rather on the basis that this is one of the few services available in this area of the north where there are so few navigational aids. Mr. Livingston summed it up at the termination of his cross-examination of Mr. Paine when he stated:

> "I have to go back to the fact that the point of the Kenora brief was in no way related to the demand for arrival/departure separation; it was related to the provision of a number of other services which are only available in that area of Northwestern Ontario through the fortuitous fact, if that is what it is, of that primary radar system that is located in Kenora, and that what you are proposing to do is to remove the only primary radar capability available to all those aircraft operating in that area. What I suppose the Kenora people had hoped the rebuttal would be, would be a rebuttal to that point. . . ."

Earlier in the cross-examination, Mr. Livingston obtained the following concession from Mr. Paine:

> "Q It was my understanding that justification rested to a large degree on assistance in navigation to IFR aircraft, handling of emergencies, and provision of weather information to the flights operating in the area and, following from that, I find that all of the justification in this brief in front of us for not maintaining the radar at Kenora is based on the criteria that was established for all the areas in Canada on whether or not an airport surveillance radar is needed for the separation of IFR and separation of aircraft arriving and departing from that particular airport. Is that correct?
>
> A Yes."
> (Emphasis added.)

In the brief submitted by the Kenora Branch of CATCA, many examples were provided which illustrate the service which primary radar provides in this area. A few of these examples will suffice to illustrate the point:

CESSNA 175 KYU

A Cessna 175 KYU with pilot and family on board departed Kenora on a VFR flight westbound. The pilot called "Mayday" and advised of oil on the windscreen and smoke in the cockpit and no transponder. With the use of directional finding equipment and primary radar, the aircraft was located 20 nautical miles northwest of Kenora and was given a vector (heading) towards the Kenora Airport. About eight nautical miles northwest of the Kenora Airport, the pilot advised that he could not maintain flight and

was going to attempt a forced landing. During the emergency, Norontair's DHC-6 was on an IFR approach to the Kenora Airport. The approach was terminated and the aircraft was steered to the last observed primary radar position of the Cessna 175. The DHC-6 was able to report that the Cessna 175 had landed safely and the pilot and family were being picked up by people at the landing site. If this aircraft had not received prompt assistance and had not been oriented towards the Kenora Airport, it is quite possible that he would have crashed farther away in more hostile terrain.

PIPER AZTEC CF-ASK

> "One of the best real life cases which supports the retention of primary radar and the Kenora Enroute Radar Unit, was the crash of an air ambulance Piper Aztec CF-ASK on March 28, 1979 on the ice at Devils Gap, Kenora. CF-ASK was transporting a patient from Sioux Lookout to Winnipeg and was about 27 miles west of Kenora when it lost an engine. The pilot turned back for a landing at Kenora. About 18 miles west of Kenora Airport he lost his second engine but was able to restart one engine about a minute later. The weather conditions at the time were marginal due to snow. The aircraft was radar vectored back to the Kenora Airport but was unable to execute a landing there. He then requested the position of the ice strip on Lake of the Woods and was being radar vectored to it when radar contact was lost with the aircraft. The pilot advised an overflying Air Canada flight that he was down on the ice or water. A helicopter was standing by downtown to provide any assistance which might be required. Communications with the helicopter were initially relayed through the overflying Air Canada flight since contact could not be established on the radar frequency. A primary target was observed close to the last position on radar of CF-ASK. This primary target was the helicopter. The helicopter was given directions to the last observed radar position of CF-ASK through the Air Canada flight. Moments later communication was established by Kenora Radar with the helicopter and on the second pass over the area where CF-ASK had been lost on radar the helicopter pilot or passenger sighted two people on shore and one in the water. After several attempts, the passenger in the helicopter was able to get the nurse who was in the water aboard, took her to the hospital and returned to pick up the two on shore. The fact that the helicopter was vectored to the exact crash site of CF-ASK has been recognized as instrumental in helping save the lives of (3) three of those on board. . . ."

The performance by the controllers, assisted by primary radar, was commended in the following memorandum sent by Mr. P. J. Proulx, Director, Air Traffic Services:

"ASSISTANCE TO CF-ASK BY KENORA ENROUTE RADAR UNIT

> Please convey to Messrs. Garry Saunders and Tom Bingham of the Kenora Enroute Radar Unit my commendations for the part they played both before and after the crash landing of CF-ASK in the vicinity of Kenora on March 28, 1979.
>
> The professional manner in which they assisted the pilot in his attempts to reach a suitable landing area, arranged for a helicopter to be standing by and directed the helicopter to the last known position of the aircraft has been recognized as instrumental in saving lives.
>
> Please convey as well the commendation of F/O. J. Reid Hannon of AC 104 who, in a letter to the Administrator - Mr. W.M. McLeish, praised the initiative and 'commendable job' of the Kenora controllers."

Those supporting the retention of Kenora radar placed a great deal of stress on the value of this equipment in detecting weather systems. This evidence was challenged by Transport Canada witnesses and, therefore, I wish to set out in full what was said in the Kenora Branch CATCA brief on the subject:

> "It's causes, effects on flight safety and what radar can do to assist in making a safer flight.
>
> In the Northern Hemisphere weather systems generally move from west to east. Sweeping across the broad prairies of Canada and the USA this mass of warm dry air starts picking up moisture in the mid-continent area from the moist fertile valleys of the Mississippi, Red and Assiniboine Rivers, huge lakes like Lake Manitoba, Lake Winnipeg and Lake of the Woods and from thousands of square miles of swampy terrain rimming the southwestern edge of the Canadian Shield. Approximately 100 miles east of Kenora lies the height of land known as the Mid Continent Divide. From the Red River Valley on the west to the Mid Continent Divide the land continually rises causing orographic lift. The elements for creating thunderstorms are all there - warm moist air, daytime heating causing rapid vertical development of cloud, cooling caused by continuous orographic lift resulting in saturation and inevitably heavy precipitation.
>
> Ideally a pilot would plan his flight based on known and predicted weather conditions, and have an uneventful flight from point A to point B. In actuality, this does not happen because of the unpredictable changes that do occur with weather systems and the fact that our economics are directly linked to the movement of people and materials from place to place on a timely basis. Weather systems move and are changing in their lateral and vertical development continually. Change in lateral speed or direction can block a formerly good flight path. New development can close off a retreat area for an aircraft. Hail, icing, and turbulant areas develop creating

particular hazards to light aircraft operating at relative low altitudes. Weather systems sometimes extending for several hundred miles in length and higher than 35,000 feet cause particular concern to high flying aircraft because of the turbulance associated with it.

North Western Ontario is an area of few roads, few suitable landing areas and thousands of square miles of lakes, rocks and trees contributing to a confusing and most often hostile environment, particularly for light aircraft to operate it. Flying is a major means of transportation in North Western Ontario. Non scheduled trips are made into remote settlements and tourist outposts for the purpose of resupply. These flights to a large degree can plan trips to avoid weather. Scheduled trips in direct support of the major industries of forestry production, tourism and mining have to be maintained within a small time frame to avoid disruptions which would be costly to the operations of these businesses. This type of flight has to be planned around the existing and forecast weather and though their routes of flight can be changed and scheduling adjusted, they normally are not cancelled except for the most severe weather conditions. Thirdly there are priority air ambulance flights which operate with the existing weather conditions and forecasts and have the business of transporting people and equipment to and from specific places with extremely short notice under the most trying of conditions. Coupled with this group are those aircraft who have become disoriented, trapped by weather with no suitable landing area close by or becoming short on fuel because of a combination of all these factors. These persons have a real need for radar weather information to assist them in completing their journey expeditiously and safely.

Primary radar has the capability of showing precipitation areas. This information is accurately displayed on a geographic map and since the radar range is 160 nautical miles, thunderstorms can be seen as far away as Portage La Prairie, Manitoba, to 50 miles west of Thunder Bay. Weather systems, sometimes in excess of 200 miles long are shown on the radar display.

The size, shape and intensity of precipitation can be directly observed. The direction of movement, speed and lateral development can be determined by observing the system for a period of time. The prime radar system has a further capability to isolate areas of intense precipitation like that associated with heavy thunderstorms. We refer to these as hard core cells. Hail, extreme turbulence and violent vertical up and down drafts are normally present. These cells frequently extend above 50,000 feet. The weather information derived from prime radar is used in many ways. Controllers use this information to assist in planning routes into and out of airports to effect a smooth flow of traffic and for passenger comfort and safety. High flying aircraft without weather radar or those who have faulty equipment, depend on a ground based primary radar system to assist them in avoiding hard core cells and intense areas of precipitation and to plan routes to avoid this weather. Low level aircraft use this information to plan routes of flights and to assist in locating areas where smaller systems can be penetrated. Specifically, at the Kenora Airport, a pilot flight planning out of Kenora, has the opportunity to view actual weather systems displayed on the radar. This enables them to flight plan an alternate route of flight if they

deem it necessary. The benefit of observing actual weather areas prior to flight is that no pilot can have difficulties with thunderstorms if they decide to stay on the ground. The removal of primary radar will deny these benefits available to pilots and adversely affect the degree of flight safety currently available. . . .

A documented case of severe weather being the predominent cause of a commercial airliner crash came out in the accident report of Southern Airlines Flight 242, which crashed at New Hope, Georgia. Mr. Francis H. McAdam's report is quite emphatic about use and retention of a primary radar system. . . . The most recent radar facility installed in the USA with which I am familiar is at Nashwauk, Minnesota, south west of Hibbing. Along with new electronic radar, the United States also installed primary radar. Hopefully we should learn from the experience of others and at least retain our present capabilities to display areas of weather by the use of primary radar."
(Emphasis added.)

Mr. Paine's criticism of the use of primary radar to provide weather information is summed up in the following passage from the Department's brief:

"Those who are unaware of its limitations would think that the AASR-1 presents an accurate picture of weather. This is not so. The picture it presents is generally inaccurate and is often misleading. The information therefore has to be used with care. Not only are the horizontal limits of the weather shown inaccurately but on a two-dimensional display there are no indications of the vertical limits of the weather build-up. Weather moving toward the radar antenna is shown more accurately than weather moving away. Areas of hazardous weather may be blocked out by other weather between them and the radar antenna. This is why the Air Traffic Control Manual of Operations (MANOPS) is correctly very cautious in the use of radar observed weather to provide flight information services (extracts of pertinent MANOPS paragraphs are in Attachment 1.)."

Mr. G. Saunders, an air traffic controller with seven years' experience at Kenora, disagreed. He testified as follows:

"I agree with the statement that the information has to be used with care. From having worked some seven years or more with that particular radar in Kenora and coordinating what I have in my radarscope with what Air Traffic is showing on theirs, we can come up with a pretty accurate picture, at least that's been my experience."

Moreover, an examination of the Manual of Operations shows that there is no caution set out concerning the use of primary radar to observe weather. The following extract from the evidence makes this clear:

"MR. LIVINGSTON: The bottom of the second paragraph it says:

> 'This is why the Air Traffic Control Manual of Operations is correctly very cautious in the use of radar observed weather to provide flight information services and extracts of pertinent MANOPS paragraphs are in Attachment 1.'

I wonder if you would turn to Attachment 1 and point out for me the direction in there that controllers are being very cautious in the use of the weather information that they are provided.

. . .

THE WITNESS: Okay. I would again stipulate that we are looking here at an amalgam of information that appears in several documents and I am taking it strictly according to what appears in the amalgam of air operations. Let's take, which particular line do you want me to explain and I will do that.

MR. LIVINGSTON: The particular line I want you to explain --

MR. COMMISSIONER: I don't see any caution --

MR. LIVINGSTON: That is on page 5.

MR. COMMISSIONER: I don't see any word of caution:

> 'The 132.1 provide all aircraft that will operate in the area concerned with information concerning severe weather conditions, such as: a thunder storm; a tropical revolving storm; a line squall; low-level wind sheer; moderate or severe turbulence; or hail.'

I think Mr. Livingston's point is that in your brief you say that the MANOPS tells people to use this weather with caution, and I when I read it, there didn't seem to be a word of caution there.

THE WITNESS: Perhaps this doesn't explicitly refer to the caution, but I believe when people are taught and use this and experience their own -- or rather observe weather, very often they will be the first one to tell you the weather is showing on the map at this place when actually the aircraft are reporting the turbulence at another location, which is not shown on their radar display. So I would concede that the attachment does not specifically state caution, but in view of what we know about the capabilities of the primary radar system, it does require some circumspection."

The retention of Kenora primary radar was supported by a vast majority of users in the area. This was established not only by a survey conducted by the Kenora controllers but also by the Administration's own survey. The latter conducted in November of 1978 by Messrs. H. G. Spicer and M. Melanson concluded as follows:

> "Users of the Air Traffic Control service were solicited to determine if they needed Air Traffic Control to provide weather advisory service based on weather data as observed on radar. In all, nineteen (19) users, such as airlines, IATA, COPA, DND, etc. were asked to comment. CATCA and the DOT Aviation Safety Bureau were also asked to comment.
>
> <u>Of the 15 users that replied, 11 (73%) indicate that they require the radar observed weather advisory service outside of the terminal airspace. Air Canada's reply was that the service is worthwhile provided it can be offered at no user charge increase over the present service. CATCA and the DOT Aviation Safety Bureau both feel that this service is neccessary</u>."
> (Emphasis added.)

The following summary of replies is contained in this report:

"1. Air Canada (109 aircraft, 550 scheduled flights per day). 'Thus we consider airborne radar as the prime means of storm avoidance.'

'However Air Canada believes that the concept of radar control assistance in storm avoidance navigation information is worthwhile provided it can be offered at a no user charge increase over the present service.'

2. CP Air (24 aircraft, 134 scheduled flights per day). 'Decision amongst the management pilot group of CP Air indicates a continued requirement for this weather advisory service (beyond 40 NM of major airports). The advisory to pilots, enroute, of severe weather info such as thunderstorms, line squalls, wind shear, turbulence, etc. as outlined in the Air Traffic Control Manual of Operations para. 132.1, 132.2 and 132.3 is considered by our pilots as a vital service.'

3. Pacific Western (20 aircraft, 105 scheduled flights per day).

4. Eastern Provincial Airways (9 aircraft, 75 scheduled flights per day). 'Information on weather beyond 40 NM from high density traffic areas is particularly important in that it permits the required weather avoidance course changes to be carried out in a timely manner.'

5. Quebecair (16 aircraft, 69 scheduled flights per day). Concerning your request as to our need for weather advisory service (radar) by Air Traffic Controllers beyond 40 NM, our reply is 'yes', we do require this Service, especially for our Dispatchers.'

6. Nordair (13 aircraft, 50 scheduled flights per day). 'Nordair would like to see weather radar advisory service extended beyond 40 NM radius of busy airports. This would be particularly useful in the event of severe frontal activity for planning departure and routing if the information was included on the ATIS.'

7. Transair (8 aircraft, 10 scheduled flight numbers per day).

   '1) This service is not vitally essential but we think it will be extremely helpful if the aircraft's airborne radar becomes unserviceable.

   2) The line pilot staff (CALPA) resist any reduction in services of any type in the name and cause of flight safety.'

8. Bradley Air Services Ltd. (34 aircraft, 10 scheduled flights per day). 'Therefore, we would consider it a retrograde step to reduce the range of such services to 40 NM.'

9. Business Flights (19 aircraft).

10. Arrow Aviation (12 aircraft).

11. Execaire (11 aircraft). 'With reference to your file number 6802-57, we at Execaire Aviation feel quite strongly that ground radar with a capability of detecting weather outside of 40 NM of major airports is of great advantage to the jet aircraft, and to the controller who is manning the particular sector that the aircraft is in with respect to deviations from airways around heavy weather.'

12. CALPA (3,000 members). 'With some reservations, such as in the western regions of Calgary, Edmonton and west of Winnipeg, the concensus appeared satisfied to limit the service to the suggested radius.'

13. IATA (representing 108 airlines). 'On the above basis, it seems doubtful whether ground-based weather radar coverage beyond 40 NM of busy airports would be necessary, but the precise coverage for a particular situation would appear to depend upon ATS requirements rather than user requirements.'

14. ATAC. We were advised during a telephone conversation that their position would be the same as the airlines combined.

15. DND. 'It is therefore strongly recommended that efforts to retain and improve Canadian radar advisory service be continued.'

16. CBAA (133 companies of which 85 are aircraft operating companies). 'With reference to your letter dated July 17th, a cross section of the members of CBAA has been polled and it is the Association's position that we support the provision of weather advisory service (radar) by air traffic controllers beyond 40 NM of a busy airport.'

17. COPA. Six (6) members replied. Of these, 5 indicated that they wanted the service. The other member seemed a bit confused.

18. RCFCA (93 members of which 39 are flying clubs). 'We would be happy to see this type of service continued, since the information provided can be and is critical to light aircraft flight planning.'

19. DOT Flight Services Branch (55 fixed wing aircraft). 'Both the Chief Executive Pilot and Chief of Training agreed that the provision of the weather advisory service is a welcome addition to the system.'

20. DOT Aviation Safety Bureau. 'Our comments would be that the provision of this service would be most beneficial to all IFR aircraft, particularly those which are non-pressurized and those which are not equipped with weather radar.'

21. CATCA. 'While this Association is not able to comment from the perspective of a 'user' we do feel the necessity to comment on the matter. In response to my requests for comments from our Board of Directors, it was pointed out that lack of weather information for enroute controllers not only prevents him from giving timely warning of build ups to his traffic, and providing radar steers around them to non-radar equipped aircraft, but deprives him of the information required to anticipate requests for deviation around the weather. This could result in his inability to approve such deviations thereby forcing aircraft under his control to operate in dangerous proximity to severe weather.' "

Retention was also supported by ATAC for the following reasons:

> "While the initially intended role of this radar unit has been altered by changes in the military presence in the area together with advances in technology, its safety role in the provision of primary radar services to aircraft operating within or transiting the Kenora area of northwestern Ontario is clearly supported by the evidence adduced at Thunder Bay.
>
> It is ATAC's position that the aggregate number of aircraft movements cannot be used solely as the basis for cost benefit analysis. Among the users of the service are scheduled jet aircraft serving Dryden, specialty service aircraft in fire suppression roles, and a considerable volume of itinerant and local small aircraft, many related to the tourist industry.
>
> This traffic mix, with its wide variance in speeds, together with the number of passengers carried aboard commercial jet aircraft climbing and descending in the Dryden area requires the radar coverage offered by the Kenora radar system, particularly in the lower manoeuvering altitudes, to support the required level of safety."
> (Emphasis added.)

The Commission received a submission from the Honourable John M. Reid, P.C., M.P., who is the federal member of parliament for the Kenora-Rainy River constituency. He observed in part as follows:

> "I feel the rationale behind Transport Canada's policy should be re-examined. Why, after twenty years of effective service is the primary radar being pulled out of Kenora? We are told that the system is obsolete, replacement parts are no longer available and that the Kenora equipment will be employed as back-up parts elsewhere. This 'cannibalization' of the primary radar system points to a lack of planning on the part of Transport Canada. If this system is to be pulled out of Northwestern Ontario, there should be some sort of replacement, maintaining at minimum the current levels of safety."
> (Emphasis added.)

It was suggested in the evidence that insofar as the use of primary radar for locating lost aircraft or assisting disoriented aircraft is concerned, the VHF-DF equipment would perform the same function. I prefer, however, the evidence of controllers who have used both VHF-DF and primary radar and who testified that with the use of VHF-DF equipment alone, the tasks as exemplified by the examples given could not have been performed. Indeed, in the Department's own manual, preference is given to primary radar over directional finding equipment. This manual entitled "The Air Traffic Manual of Operations", paragraph 153.3, provides as follows, "You may use emergency DF procedures provided: 1. Radar is not available".

In addition, the Direction Finding Handbook observes that radar is to be given preference over directional finding equipment.

COMMENT

On the basis of all the evidence before me, I am satisfied that it would be a mistake to terminate the radar facilities at Kenora. To do so could have a serious adverse effect on aviation safety in the area.

The formula upon which it was decided to terminate those facilities is, in my opinion, too narrow a base upon which to determine the fate of this navigational aid which is so important in Northwestern Ontario. The formula fails to accord sufficient weight to the

facts on which its retention was supported by CATCA and the majority of users in Northwestern Ontario. These factors include the following:

1. Assistance in navigation to IFR aircraft;

2. Assistance in emergencies; and

3. The provision of weather information to aircraft operating in the area.

It should also be observed that while the benefit cost formula may have been suitable to determine whether airports should be provided with new radar equipment initially, in this case we are dealing with existing equipment. In this respect, Mr. Trevor G. Paine, when being questioned, made the following concession:

> "MR. COMMISSIONER: At any rate, getting back to what Mr. Sopinka asked you earlier, this formula that you set forth in detail at page 13 only applies to determine whether you should have a primary surveillance radar as an adjunct to an SSR.
>
> THE WITNESS: Right, sir."

There is no reason why the existing equipment cannot continue to function. While it is obsolete, with the dismantling of many primary radar services of the AASR-1 type across the country, there should be a surplus of replacement parts to keep this system functional. Its retention obtained the support of those who must fly in the area and whose need for the service even with its limitations, were demonstrated. Until it is replaced by equipment which is superior, it should be retained to perform the many valuable functions that it serves in the interests of aviation safety in an area where present navigational services are minimal.

PART V

FLIGHT SERVICE STATIONS

INTRODUCTION

Flight service stations were originally known as aeradio stations and manned by air radio operators. Of more recent date, the stations and personnel have been upgraded with the new designations of Flight Service Stations and Flight Service Specialists. They provide an advisory service to aircraft, and no attempt is made to exercise any form of control.

The flight service specialists provide an advisory service to both enroute aircraft within approximately 50 miles of the airport and arriving or departing aircraft within approximately 10 miles of the airport.

Since most of the airports in Canada are uncontrolled and many of them are in remote areas of the country, the flight service specialists provide an invaluable service to aviation safety.

In its brief, the Air Administration described the services provided by flight service specialists in the CATA Objectives, Organization and Policies Manual Volume III - Civil Aeronautics, as follows:

> "FLIGHT ADVISORY SERVICE:
>
> This service, currently being provided by approximately 112 MOT Aeradio Stations, has been built up gradually over the years. It is particularly useful to private business and small airline pilots who do not have communications systems of their own, but is also used extensively by larger airlines and the military to supplement their own systems. Communications and information handled within this category may be summarized as follows:
>
> - Distress and Urgency communications are conducted and controlled.
> - Hourly weather reports are broadcast and provided on request.
> - Notices to Airmen (NOTAM) are broadcast and provided on request.

- Pilot weather reports (Pireps) are actively solicited, broadcast and provided on request or when information considered required.

- Significant In-flight Weather (Sigmet) is broadcast and provided on request in areas where provided.

- Air Traffic Control communications service is provided in areas where there is no direct pilot-to-controller communications.

FLIGHT ADVISORY SERVICE:

Other information of assistance to a pilot in completing his flight in safety (includes communications checks, information required for landing and take-off, regulations pertaining to the airport, airway or air route, Meteorological information including forecasts, winds, etc., altimeter or Kollsman setting as appropriate, airport condition, obstructions, etc.)

Other aircraft traffic as obtained from ATC, flight plans, flight notification, etc. Pilots of aircraft operating within 50 miles of aerodromes at which no control tower is established, but at which an Aeradio Station is located, are advised to establish contact with the appropriate Aeradio Station, and provide details of their flight plan, last known position, track and altitude.

LANDING AND TAKE-OFF:

This Flight Advisory Service shall be provided at Airports where control towers are not established or are not operational on a full time basis. At such locations aeradio operations rooms are to be located in the airport terminal or operations building at a point that will provide operating personnel with a clear view of the ramps, runways and approaches. Consideration should also be given to easy access to these offices by pilots for filing flight plans and obtaining pre-flight information.

This Advisory Service is provided for safety purposes and shall include wind direction and velocity, favoured runway, altimeter setting, operation of airport lighting, pertinent known local traffic, airport vehicle traffic, NOTAM, and any other information that may assist the pilot in completing his flight in safety. Advice concerning airport traffic patterns, approach or enroute procedures, navigational aids and facilities are published in Canada Air Pilot or shown on enroute charts shall be provided on request. The provision of this service shall be of an advisory nature only and no attempt shall be made to exercise Airport Control.

VEHICLE ADVISORY:

At selected airports where there is no control tower or the tower operators on limited hours, the Aeradio Station may provide a Ground Advisory Service. Where this service is provided, the Aeradio Operator will be responsible for collecting and disseminating advisory information on ground vehicle traffic operating on the manoeuvering area of the airport. Certain action may be suggested by the Aeradio Operator, but control instructions are not authorized.

MONITORING:

All air navigation radio aids within the area of responsibility of the station are monitored electronically or aurally on a continuous or periodic basis.

TECHNICIAN DISPATCH:

Technician Dispatch is provided so that the Ministry's Electronics Technicians can perform preventive maintenance at widely separated sites, but still be available immediately to provide emergency maintenance. A log is kept of the times the emergency breakdown is reported, Technician dispatched, and repairs effected.

METEOROLOGICAL OBSERVATIONS:

Surface observations are provided by approximately 85 MOT Aeradio Stations. The majority are on an hourly basis. Instruments, communications procedures and circuits used are in accordance with Atmospheric Environment Service instructions."

Although providing complementary services, the flight service specialists and the air traffic controllers are governed by separate branches within the Air Administration. The flight service specialists are under the direction of the Telecommunications and Electronics (Air) Branch and the air traffic controllers are under the direction of the Air Traffic Control Branch. This division had its inception when the flight service specialists were aeradio operators and the division has continued. The consequences of that division were reviewed by a committee from the Pacific Region which undertook a study entitled "Study of Communications Interface at Uncontrolled Airports". Under the heading "ATS Controller-Aeradio Operator Working Relationship", the committee concluded as follows:

"CONCLUSION:

The CATA control and advisory services are functioning as separate entities, rather than as complementary parts of a unified air traffic services system. A lack of appreciation for one another's roles in the system is symptomatic of an organizational structure which has failed to adapt to the realities of the day.

RECOMMENDATION:

That a decision be made immediately at the most senior level in the Air Administration to reorganize the management of the control and advisory functions now contained in two Branches into one Branch.

In order to accomplish this without the need for another elongated study, that an implementation committee be formed, comprising representatives from all Branches within the ANS activity and stating a target date for implementation.

DISCUSSION:

The areas of responsibility of each agency are not clearly defined, partly because the definition of responsibilities arise from two different managerial sources. It is unreasonable to expect Branch Managers to be completely familiar with the policies and procedures of another Branch, and even more unreasonable to expect their employees to be fully conversant with each others' duties and responsibilities. It would appear that for maximum efficiency, only one agency should be responsible for the provision of the entire control/flight advisory service.

It was observed that in the United States there was a career progression between air traffic controllers and flight service operators - in both directions. This movement of personnel is greatly facilitated as a direct result of both services being part of one Branch.

The Telecommunications and Electronics Branch has become fragmented into two groups. One group provides a service (radio operators) and the other group, maintenance (technicians). It would seem that the service function would have more in common with ATS goals than with the maintenance side of T&E.

Advantages of such a reorganization would include:

- this organizational structure is internationally accepted;
- proper training and knowledge would be assured, areas of overlap would be eliminated;
- areas of responsibility could be set out and followed;
- a greater rapport between controllers and aeradio operators would be achieved; and
- a more flexible career progression would be possible. The RO's would utilize ATS training facilities to a greater degree."

(Emphasis added.)

I will subsequently be commenting on this subject under the heading of The Present CATA Organization.

The Commission had the benefit of a searching inquiry into the alleged deficiencies in the operation of flight service stations and had the benefit of the advice of many very knowledgeable witnesses as to how the system can be improved. The most thorough presentation was made by Mr. Michael G. Jeffries, the Regional Supervisor of Flight

Services for the Pacific Region. He presented an extremely comprehensive and constructive exposition of the role and the problems of flight service specialists. CALPA also contributed greatly to the work of the Commission with respect to this subject, as indeed did many others. I have selected from the submissions made those which I think are the most significant. Many other points were taken which I think were of a sufficient substantial nature to warrant further studies by the Air Administration.

THE LOCATION OF FLIGHT SERVICE STATIONS

The following tables identify the location of flight service stations and identify those that are collocated with towers and/or weather offices or weather stations:

"Note: In the following tables the term Weather Office means the availability of AES presentation service. A Weather Station indicates surface weather and weather information only.

A. Collocated Towers-Weather Offices-and Flight Service Stations

24 hour operation all 3 facilities	WO & FSS H24 (Tower part-time)	FSS H24 (Tower & WO part-time)
Vancouver	Lethbridge	Penticton
Calgary	Whitehorse	Castlegar
Edmonton	Yellowknife	Kamloops
Winnipeg	Regina	Prince George
Ottawa	Thunder Bay	Grande Prairie
Toronto	Windsor	Fort Nelson
Montreal (Dorval)	Quebec	Fort St. John
St. John's	Goose	Fort McMurray (WS)
Gander	Sydney	Brandon
Halifax		Thompson
Moncton (FSS does surface WX H24)		Saskatoon
		North Bay
		Sudbury
		London
		Sept-Iles
		Fredericton
		Saint John
		Sault Ste. Marie

B. Collocated Flight Service Stations-With AES Weather Offices or AES Weather Stations
(weather stations indicated by an asterisk)

24 hour operation both facilities	WO or WS Less than H24
*Cambridge Bay	Kingston
Resolute	Terrace
Churchill	Port Hardy
Frobisher	*Hay River
*Charlo	*Watson Lake
	Inuvik
	Dauphin
	Prince Albert
	*The Pas
	*Fort Chimo

C. Collocated Flight Service Stations and Control Towers

(No AES Weather Office or Weather Station)

FSS Operations H24	Both FSS and Tower Operations Less than H24
Red Deer (Seasonal Tower)	Nanaimo (Seasonal Tower)
Charlottetown (WO off airport)	
Abbotsford	

D. Stand-Alone Flight Service Station

1. Those Reporting Aircraft Movements (1978 Itinerant Movements)

Timmins (18,830)
Medicine Hat (18,815)
Williams Lake (17,904)
Peace River (16,917)
La Grande (15,932)
Mont Joli (14,973)
Dawson Creek (12,949)
Muskoka (12,776)
Schefferville (12,269)
La Ronge (11,995)
Sandspit (11,015)
High Level (10,545)
Cranbrook (10,544)
Norman Wells (9,392)
Wiarton (9,369)
Whitecourt (8,972)
Sherbrooke (8,959)
Fort Smith (8,804)
Kenora (8,758)
Wabush (8,732)
Uranium City (8,625)
Deer Lake (8,497)
Sioux Lookout (7,632)
Yarmouth (7,666)
Lynn Lake (7,385)
Campbell River (6,897)
Quesnel (6,960)
Roberval (6,697)
Prince Rubert (6,553)
Kapuskasing (6,317)
Stephenville (6,017)
Earlton (5,943)
Gaspe (5,851)
North Battleford (5,835)
Rouyn (5,812)
Matagami (5,667)
Smithers (5,647)
Dawson (5,215)
Fort Chipewyan (4,635)
Baker Lake (4,627)
Mayo (4,569)
Vermilion (3,897)
St. Anthony (3,762)
Tofino (2,788)

Tuktoyaktuk (8,487)
Poste-de-la-Baleine (8,186)
Yorkton (7,876)
Swift Current (7,851)
Fort Simpson (2,756)
Coppermine (2,267)
Inoucdjouac (1,992)
Burwash (1,007)

2. Not Reporting Aircraft Movements

Nitchequon
Chesterfield Inlet
Coral Harbour"

The effect of the current financial restraints on the flight service station system was discussed as follows in a brief submitted by the Telecommunications and Electronics Branch:

"The FSS system, like all other areas of the Government is operating in a period of restraint. Person years are limited as are the financial resources to expand the service. The demand for FSS services is expected to continue to increase through the 1980's in line with the pattern established during the 60's and 70's. Under normal circumstances for future planning, staff would have to increase at about the same rate as the service demand. However, in view of Treasury Board's current 'Hold the line' policy regarding person year allotments coupled with an aviation public expecting a more effective and efficient service, alternative actions (in addition to the technical and operational steps mentioned above) were required. To this end, expenditure curtailment and cost reduction committees have been active looking at all financial aspects of FSS operations. Committee recommendations include:

(1) Decommissioning stations which no longer have a significant operational role.

(2) Relocating stations to areas where the demand for aviation services is greater.

(3) Closing stations during the least busy periods of the day.

(4) Establishing Remote Communications Outlets and Navigational Aid Monitors which are controlled from staffed Flight Service Stations.

Some of these recommendations have already been implemented by Regions. Others are being analyzed with action dependent on current and projected funding priorities.

Despite the person year and financial constraints upon the FSS system, coupled with the implementation of new services, it may be noted that a recent CATA Program Forecast Document indicated that FSS person year efficiency increased 37% since 1975."

Unfortunately, the financial restraint has had its greatest impact on the remote areas of Canada where flight service stations and navigational aids are most needed.

As I noted earlier, in the determination of the location of control towers the amount of traffic is a major factor to be considered since the principal service supplied is that of separation of traffic. In the determination of the location of flight service stations however, traffic should not be the major criterion. There are many remote areas where there are presently few, if any, navigational aids, and in many of these areas, by reason of terrain and weather, flying conditions are the most hazardous. It is in such areas, even though of limited traffic, that the need for flight service stations and navigational aids is the greatest.

Mr. Lesley Louttit in his brief on behalf of Grand Council Treaty #9, to which reference has previously been made, made an eloquent plea for additional navaids and, in particular, flight service stations. In part, he submitted as follows:

> "AERADIO STATIONS - FLIGHT SERVICE STATIONS:
>
> The telecommunications and Electronic Branch of Transport Canada operates more than one hundred Aeradio Stations in Canada. Most are located along established airways or air routes and are associated with both large and small airports. These aeronautical communication stations or Flight Service Stations, as they are now called, are staffed by trained and qualified personnel whose primary responsibility is the provision of an efficient flight safety service for the benefit of pilots. At the present time, Flight Service Stations exist at Timmins, Kapuskasing, Sioux Lookout, and Kenora which service Peripheral Aeradio Stations at Moosonee and Red Lake, Ontario which are the major northern towns of Ontario.
>
> It is to be noted that there are no apparent Government standards or requirements for air-ground communication at our northern airstrips. The facilities that do exist are supplied by air carriers in order to service their own company operations. It is further noted that such aeradio equipment that is in existence is manned by ground operators with little or no formal training in radio operation or interpretation of appropriate weather data. Currently, ground to air communication systems are excluded by the Ministry of Transportation and Communications in its Remote Airport Program.
>
> a) <u>It is therefore recommended that Transport Canada consider the establishment of Flight Service Stations at Red Lake, Pickle Lake and Moosonee with connecting Peripheral Aeradio Stations (PAL) northward to isolated communities accessible by line transmission where possible.</u>

b) It is further recommended that Transport Canada, being responsible for air traffic under federal regulations, install the appropriate VHF/HF air-ground radio communications equipment at all the northern airports described in Ministry of Transportation and Communications Remote Airport Program.

c) It is further recommended that Transport Canada initiate a special training program for native people in the Treaty #9 that is similar to the 'Arctic Airports' program established in the Yukon, Northwest Territories and the Arctic for such skills required for radio operators, airport maintenance personnel and weather data interpretation.

The establishment of Flight Service and Peripheral Aeradio Stations in the proposed locations would ensure that radio and weather personnel properly trained by the Ministry of Transport, would provide a much needed flight safety service that is grossly lacking at this time north of the 51st parallel." (Emphasis added.)

Mr. James Biggs is the Chief Pilot for Bearskin Lake Air Services Limited, which carrier operates in those northern regions referred to by Mr. Louttit. He had experienced the program in Northern Manitoba under which native people are trained to provide weather and traffic advisory services and testified as follows:

"(Sopinka) Q What about the weather reporting facilities in this area? For instance, if you were flying to Big Trout Lake, do you think it is adequate?

(Biggs) A No, it is certainly not adequate. I can't understand why they don't adopt the system that they have in Northern Manitoba. The airports in Northern Manitoba have taken local native people, installed a terminal building with a radio taking the people out and training them sufficiently enough to do a system weather observation and to give altimeter settings, one direction; visibility and ceiling; and they are there. I'm not sure what hours they operate, but it is fairly reasonable hours and it seems to alleviate a lot of the problems.

(Sopinka) Q And this has been done with the Department of Transport?

(Biggs) A No, that is done on the Provincial level.

(Sopinka) Q Have you had personal experience with this service?

(Biggs) A In Northern Manitoba?

(Sopinka) Q Yes.

(Biggs) A Yes, I have. It is very adequate. They also give traffic advisory. They almost have the same capacity as a flight service operator in that respect.

(Sopinka) Q And do they train native people?

(Biggs) A Yes, they have."
(Emphasis added.)

CATA supported the principle enunciated in the Treaty #9 brief and, in doing so, made the following observation:

> "A system of assuring an adequate level of aviation related training would certainly be of immediate benefit to local aviation and the entire weather system. This training, sponsored, controlled and paid for by organizations responsible for the well being of native people would fill many of the existing gaps in our reporting network in northern provincial areas and in the Territories."
> (Emphasis added.)

I have detailed elsewhere the great dependence that our native people in the remote areas of Canada have on air carrier services and of their well-founded concern for aviation safety in those areas. In my opinion resources must be found to extend to other remote areas in Canada the program initiated in the Yukon, Northwest Territories, and Northern Manitoba. This program involves the use of native people in providing flight service station services and weather information in those remote areas dependent on air carriers. Such monies would be well spent when regard is had to the reduction of accidents which such a program would bring about.

As is also noted in the CATA brief, the training of such native people "would fill many of the existing gaps in our reporting network in northern provincial areas and in the Territories".

Although it would not be feasible to commission control towers in outlying areas where the traffic is minimal, flight service stations should be established, at least, at those airports which are serviced by a scheduled air carrier.

AIRPORT VISIBILITY FROM FLIGHT SERVICE STATIONS

As noted above, the Air Administration's policy provides that the flight service specialists are to be located in the airport terminal or operations building "at a point that will provide operating personnel with a clear view of the ramps, runways and approaches". Unfortunately, this policy has not been strictly adhered to. As a consequence, there are many flight service stations where the visibility is such that the flight service specialists cannot see many of the manoeuvring areas of the airport nor even the approaches.

An analysis of the visibility from the flight service stations in the Pacific Region was undertaken by Mr. Jeffries. I set out below the reference to that study from Mr. Jeffries' brief:

> "The data below shows the visibility rating factors for each FSS within this Region, where there is not a 24 hour tower in operation.
>
> The factors are rated with the scale:
>
> POOR: FSS can only see a portion of the manoeuvering area.
>
> FAIR: FSS can see the manoeurvering areas of the airport.
>
> GOOD: FSS can see the manoeuvering areas, and approaches to runway(s).
>
> EXCELLENT: FSS can see the manoeuvering areas, approaches to runway(s) and circuits i.e. 360° vision.

FLIGHT SERVICE STATION	RATING
ABBOTSFORD	FAIR
PRINCE RUPERT	POOR
SANDSPIT	POOR
CAMPBELL RIVER	GOOD
NANAIMO	POOR
PORT HARDY	POOR

TOFINO	POOR
PRINCE GEORGE	POOR
TERRACE	POOR
SMITHERS	FAIR
QUESNEL	POOR
WILLIAMS LAKE	FAIR
PENTICTON	POOR
CRANBROOK	FAIR
CASTLEGAR	POOR
KAMLOOPS	POOR"

The lack of visibility from the flight service stations is by no means unique to the Pacific Region. The Commission was provided with examples of the lack of visibility from the flight service stations in many other areas of Canada. In particular, in the Quebec Region the visibility from many of the flight service stations would, on the basis of a similar analysis, be rated as poor.

Mr. Charles MacDonald, a flight service specialist in the Quebec Region, testified as to the problems caused by a lack of visibility of the runway areas from the flight service station. He referred to the following incidents in support of his concerns:

1. In Frobisher Bay on April 10, 1973, a DC-3 crashed 2500 feet from the runway after takeoff. Three persons were seriously hurt and the temperature outdoors was 25° below F. The flight service specialist was alerted by an airport maintenance employee who happened to be in the area. The flight service specialist had not seen the crash because of the location of the flight service station.

2. In Frobisner Bay on August 23, 1978, a DH6 crashed into the glide path antenna on final landing. The flight service specialist learned about the crash by the ELT (emergency locator transmitter). Because of the location of the flight service station, he could not see the crashed aircraft.

3. Frobisher Bay, August 29, 1979. An aircraft crashed 2000 feet from the runway after take-off. The aircraft was burning for ten minutes, and the flames were visible as far away as the village, but the flight service specialist had no knowledge of the crash until he was alerted by a Nordair employee. Meanwhile there were other aircraft in the vicinity and the flight service specialist was in no position to advise them of the crash.

4. Fort Chimo, August 8, 1979. A Nordair Boeing 737, approaching Fort Chimo, contacted the flight service specialist and told him that he could not see the landing lights despite excellent visibility. The flight service specialist replied that all the landing lights were on. The pilot replied that he still could not see the landing lights. In fact, there was a breakdown in the electrical system but because the flight service specialist could not see the runway, he was unaware of the deficiency. The aircraft finally landed in Frobisher Bay, some 340 miles away.

Many other examples were provided to the Commission of incidents concerning vehicles and aircraft on runways while aircraft have been landing or departing. These incidents could have been prevented if the flight service specialists had had a clear view of the airport, the manoeuvring areas, the runway and approaches.

Mr. Jeffries provided two examples which occurred at Port Hardy, in British Columbia. These are set forth in his brief as follows:

> "One such incident occurred between PW412, a Boeing 737, and C-FOCQ a Beaver on January 10, 1979. . . . In this incident C-FOCQ taxied for departure on runway 07. Shortly after PW412 taxied for departure on runway 10. Because of the time frame involved, the Specialist assumed, because he could not see the runways, C-FOCQ had departed when in fact the pilot was holding short on runway 07 conducting his pre-flight run-up. When PW412 broadcast his intentions for departure. The alertness of both pilots prevented a possible mid-air collision.
>
> A second incident occurred on June 10, 1980, when a tractor and work crew were on runway 10. Due to a misunderstanding the duty Specialist was under the impression the tractor was cutting grass alongside the runway when in fact they were filling cracks on the runway. . . . Fortunately, the work crew ran out of filler material and left runway 10 approximately one minute prior to an aircraft landing. These are just two examples of a number that indicate problems encountered when the FSS cannot properly see the runway. These

> types of incidents could be prevented if all FSS's are provided with a clear view of the airport and runway approaches as stated in policy CA 301 (TAFO)."

At Port Hardy the flight service specialists have a very poor view of the ramp and no view of the runways and approaches due to rough ground and surrounding buildings. On February 28, 1976 the tower building was vacated by the air traffic controllers in response to a resource utilization proposal. If the flight service specialists were relocated in the tower, they would gain a vastly improved view of the airport and approaches. This has been firmly resisted by Pacific Air Traffic Control. Traffic forecasts indicate a control service at Port Hardy may be necessary between 1986 and 1990. Nevertheless the flight service specialists continue to labour under very poor visibility conditions. This is merely one example of the lack of co-operation that exists when what is essentially one service is divided into two branches.

Mr. Jeffries, in his brief, suggested the following solutions amongst others:

> "(a) FSS's that provide a full or part-time landing or take-off advisory service must be positioned at a point that will provide Specialists with a clear and unobstructed view of ramps, taxiways, runways and runway approaches as stated in CATA's Objectives and Policies manual CA301 (TAFO) and re-emphasized in DGCA's memo to all Regional Administrators, Aeradio Station - Location of Operations Room dated July 5, 1978.
>
> (b) Compromises as to the location of and expenditure of new FSS's such as Campbell River must not be allowed to occur if flight safety is to be considered. These types of considerations not only delay the actual construction but incur additional expenses owing to inflation. Compromises to the location jeopardizes a safe and efficient landing and take-off advisory service.
>
> (c) The design and location of new Air Terminal Buildings that house FSS's must take into consideration the requirement for FSS's to have a clear unobstructed view of ramps, taxiways, runways and runway approaches. Consideration must also be given for easy access to FSS's by pilots to obtain pre-flight information and file flight plans.
>
> (d) In the interests of good management of public funds and resources that a standard building design be developed for use in all new FSS, tower and FSS/Tower installations, and that such a design would contain the flexibility necessary to allow changes to be made as might be required without expensive major renovations having to be made."

There is no reason in those cases where new flight service stations are being commissioned why the flight service stations should not be located to give the flight service specialists a clear view of the ramps, runways and approaches in order to meet the stated CATA policy. The necessity for such a view is obvious. Yet there have been recently constructed flight service stations which do not provide the flight service specialists with such a clear view. Furthermore, in many cases, flight service stations can be relocated to use existing facilities which are idle and which would afford the flight service specialists the view necessary to improve safety at those airports.

I appreciate that in view of the limited resources and the great demand on them, new construction to replace those flight service stations with present inadequate facilities may not be possible at this time, but a long-term program to do so should be undertaken. Consideration should also be given to the recommendations of Mr. Jeffries for a standard building design for use in all FSS installations.

FLIGHT SERVICE SPECIALISTS' CONTROL OF VEHICLES AT UNCONTROLLED AIRPORTS

Flight service specialists provide a vehicle advisory service. That service is described in the CATA Objectives, Organization and Policies Manual, referred to above, as follows:

> "VEHICLE ADVISORY:
>
> At selected airports where there is no control tower or the tower operators on limited hours, the Aeradio Station may provide a Ground Advisory Service. Where this service is provided, the Aeradio Operator will be responsible for collecting and disseminating advisory information on ground vehicle traffic operating on the manoeuvering area of the airport. Certain action may be suggested by the Aeradio Operator, <u>but control instructions are not authorized</u>."
> (Emphasis added.)

As was pointed out in the evidence, there are numerous reasons that necessitate persons to operate vehicles on the airside areas of an airport. Telecommunications maintenance technicians use taxiways and runways to reach various navigational aid sites. Airport branch personnel are required to operate vehicles on manoeuvring areas of the airport in order to maintain them in a safe operational status, by, for example, crack filling, snow

removal, grass cutting, etcetera. Telecommunications Engineering personnel use taxiways and runways to reach new system installations.

The matter is further aggravated by reason of the fact that although all persons are required to possess a restricted radio operator's certificate prior to operating a radio transceiver, including persons operating vehicles on airports, many persons are not properly certified. According to Mr. Jeffries only at those sites where a Department of Communication District Office exists has there been any effort to certify all vehicle operators. Furthermore, although the Pacific Region took the initiative in developing an "Airports Procedure Manual for Vehicle Operators", it has not been adopted by Headquarters. In his opinion there are many deviations from proper procedures. He concludes that the two committees which are presently in operation, one concerning a national vehicle operator's manual, the other concerning the certification of vehicle operators, appear to be working in conflict with each other.

Furthermore, under present legislation, there is no provision making it mandatory for vehicles to report their intention when operating on the manoeuvring area of an airport. Thus, the flight service specialists cannot be assured that a serious hazard between aircraft and vehicles does not exist.

Mr. Jeffries made the following recommendations amongst others:

> "1. Specialists must have the authority to direct vehicle operators to clear the manoeuvring areas of airports through a 'positive vehicle advisory' service."
>
> 2. Prior to new employees operating vehicles on airport sites, they must receive sufficent training in radio and airport operating procedures.
>
> Annual on-site refresher training must be provided for all others. Resource personnel (i.e. FSS Supervisors, Control Towers Chiefs or deputies) should be utilized to the maximum extent possible."

COMMENT

The overwhelming weight of the evidence has satisfied me that flight service specialists should have the authority to control ground vehicular traffic operating on the manoeuvr-

ing area of the airport at all times when such traffic is not under the direction of an air traffic controller.

The hesitancy in the past to give the flight service specialists such authority has stemmed from the concept of the traditional role of the flight service specialists as one of providing advisory service only, as distinguished from the function of an air traffic controller. But I am satisfied it is necessary in order to enhance aviation safety that the authority to direct vehicles to clear runways and to designate an active runway for aircraft should be granted to flight service specialists, when that function is not being performed by the air traffic controllers.

The Commission was advised that the matter is presently under consideration by the Air Administration which is embarking on a further detailed study. In my respectful opinion there has already been sufficient study of the matter and a positive vehicle advisory service should now be implemented.

In addition, steps should be taken to ensure that all persons operating a vehicle on the airside of an airport should be properly certified and qualified to do so.

PART VI

COMMUNICATIONS AT UNCONTROLLED AIRPORTS

INTRODUCTION

The fatal accident at Cranbrook, British Columbia, which occurred on 11 February 1978, and to which reference has been made in earlier parts of this Report, propelled the Air Administration into a national study of the problems with respect to communications at uncontrolled airports. The result of these studies was the publication of Mandatory Frequency Guidelines followed by Air Navigation Order Series V, No. 11 which included a provision for IFR Flight Position Reports. The adequacy of these measures, as a solution to the problems identifed, was the subject of much evidence before the Commission. In order to understand the problems and the recommendations for improvement, a brief history of events leading up to the publication of the mandatory frequency guidelines is appropriate.

In the late 1940s and '50s, both VFR and IFR aircraft used a communications network consisting of aeradio stations and air traffic control centres. The aeradio stations were located at important points along the airway system and provided advisory service to both VFR and IFR aircraft. The aeradio stations were used as a communication link between IFR aircraft and the area control centre. Control information passed to and from the aircraft via the aeradio operator to the controller. Communications between the aeradio operator and the controller were by means of a land line.

PERIPHERAL AIR TRAFFIC CONTROL (PAL) AND DIRECT CONTROLLER PILOT COMMUNICATIONS (DCPC)

This situation changed with the installation of Peripheral Air Traffic Control (PAL) facilities or Direct Controller Pilot Communications (DCPC). VFR flights now used the normal aeradio frequencies, but IFR flights communicated directly with the controller through the PAL station on a separate frequency. Although there were benefits of reduced delays in obtaining IFR clearances, reduced workload and more effective IFR control, this change had one serious disadvantage. It meant that aircraft operating in

the vicinity of an uncontrolled airport reported to separate agencies with no apparent coordination with the result that the aeradio operator might be unaware of IFR traffic and, therefore, be unable to advise local VFR traffic.

Mr. Jeffries discussed the consequences of the introduction of PALs as follows:

> "The level of flight safety has been reduced through the indiscriminate establishment of ATC PAL's in areas being serviced by Flight Service Stations."

He produced the following examples of the types of incidents resulting from the introduction of PALs:

"SITUATION: (samplings)

June 14/78	PW415 taxied on active runway prior to receiving airport advisory.
June 23/78	PW310 departed XC while working ACC YC. FSS broadcast blind aircraft off due no contact PW310. Aircraft CFEDE reported by VOR. Unable contact PW310, or YC ACC. Aircraft missed by 100 yards!
July 23/78	GBFL departed XS for McKenzie IFR. No ETA given FSS XS by the ACC. Nil heard back from ATS.
Sept. 6/79	TH406 working ATC on PAL while on ramp at Williams Lake. PCA spoke to operator.
Nov. /79	FTFV DC3 Taking clearances direct on ATC PAL.
Feb. 19/80	FTFV DC3 departed WL after working ATC on their PAL and departed without the knowledge of the FSS. This aircraft often transport dynamite!
Feb. 20/80	A/PCA calls for a Study Group to review incidents and the ATC PAL/FSS situation.
March 5/80	Two-way memo to PCAW given outlining our concern over PWA working ACC direct.
March 19/80	ATC working PWA direct on runway at Sandspit.
March 20/80	ATC working PWA direct on runway at Sandspit.

March 21/80	ATC working PWA direct on runway at Sandspit.
March 25/80	Memo instructing that all ATC PAL's input/output be removed from the FSS consuls.
April 9/80	Concerns of ATC PAL usage expressed in a memo to PCA from PTEO, asking for a flight safety meeting.
July 11/80	A PW737 taxi onto manoeuvering area while working ACC. Other aircraft in circuit."

On March 18, 1975 officials of the Western Region responded to a proposal for the installation of another PAL - DCPC as follows:

> "Our experience with a number of DCPC facilities in areas which have a high volume of VFR traffic has led us to a realization that severe procedural problems exist, which we fear will be compounded with DCPC facilities dealing with low level traffic."

This statement led to the formation of a committee with Mr. Douglas E. McDonell, Airways Division, as Chairman. Mr. McDonell impressed me with his ability, knowledge and sincere dedication to the cause of aviation safety. On January 29, 1976, this committee produced a report entitled "Aeradio Flight Advisory Services versus ATS Peripheral DCPC" which became known as the "Interface Report". The report was critical of Transport Canada systems, services and operating procedures in the following areas:

"- Examples of Operational Difficulty

- Aeradio Advisory Services

- Peripheral Direct Controller to Pilot Communications

- Applicable CATA Policies and Manuals

- Aeronautical Information Publications

- Aeradio Air-Ground VHF Frequencies"

Notwithstanding that no rules were being broken by pilots, controllers or aeradio operators, the report indicated a very hazardous operating environment. The committee

recommended a national study. Their report and recommendations were forwarded to the Administrator of CATA on May 7, 1976.

Mr. McLeish responded on July 5, 1976 as follows:

> "This is in reply to your memorandum of May 7, 1976, file 5202-1 (WRA).
>
> The report submitted to you by the Regional study team has been examined without detailed analysis by this office and by involved Directorates within CATA. Understandably, we are not able at this early stage to determine which, if any, basic policies will require revision; <u>however, the concerns evidenced in your memorandum and in the inter-branch report dictate a requirement for early and thorough analysis of pertinent operational areas by this Headquarters</u>. In this regard direction to all Regions from DTA and DAT concerning their individual areas of interest will be forthcoming. Basically this will assure coordination between ATS units and Aeradio Stations and ensure that Radio Operators understand their role in the provision of 'advisory' services as opposed to the Air Traffic Controllers roles in the provision of 'control' services.
>
> DGCA has been requested to form a study group which will consist of representatives of involved branches. You will be informed of the terms of reference, the make-up of the group and tentative project planning as soon as this information is available. Regional participation in the team's work will be required."
> (Emphasis added.)

TRAFFIC ADVISORY SERVICE AREA (TASA)

In the region, immediate action was taken and on May 11, 1976 terms of reference were issued for a new committee entitled "ANS Committee on ATS Tower/IFR DCPC Operational Interface with T & E Aeradio Stations" which became known as the "Interim Solutions Committee" and included Mr. McDonell as a member. The Committee's final report was submitted on June 9, 1976.

In order to overcome the hazards identified in the January 1976 report, the Committee recommended immediate establishment of a Traffic Advisory Service Area (TASA) at Inuvik, Fort McMurray and Lethbridge to be followed by implementation at other sites after a trial period.

The Traffic Advisory Service Area applied to the airspace within 20 nautical miles of the airport, from the surface up to the level of the base of the "block airspace". The procedures applicable in this airspace ensured that at any given time only one agency, either aeradio or a control tower, was responsible for providing a traffic advisory service to all participating aircraft within the TASA. TASAs were established in Fort McMurray and Inuvik, and the evidence showed that they were very successful in reducing the hazards at these airports. The experiment was, as a result, extended to Yellowknife.

The headquarters' project team established pursuant to the memorandum of July 5, 1976, reproduced above, made an analysis of the Western Region Report and submitted its draft report on February 18, 1977. The headquarters' project team was headed by Mr. Frank C. Black, Superintendent, Air Facilities Requirements and Inspection. Mr. Black also impressed me as a very capable and knowledgeable manager although, as will subsequently appear, he did not agree with Mr. McDonell.

Mr. McDonell was very critical of the headquarters' report, which he described as one of the greatest disappointments that he had experienced as an employee of Transport Canada.

The report of the headquarters' project team did not recommend any changes of the kind implemented in the Western Region. The rationale for failure to do so is contained in conclusion 3, set out below:

> "3. Responses to queries to other Regions revealed that the particular operational interface problems described in the Western Region report appear to be peculiar to that Region and to specific locations."
> (Emphasis added.)

Mr. D. J. Douglas, Regional Controller, Civil Aviation for the Western Region, responded to this report in rather uncomplimentary language. With respect to conclusion 3, he said:

> "We do not agree. We strongly believe, that under current policies and procedures, operational interface problems such as described in the Western Region report must occur, or at least have the potential to occur, in all Regions. This is a key point, and we doubt that the Headquarters team posed the right questions to the right people. In our further investigation, related to finding "interim solutions", we found that:

a) Operating personnel are reluctant to report incidents which might reflect adversely on their own handling of a situation, because they don't fully appreciate that a 'system problem', and not their own competence, could be responsible;

b) Operating personnel, especially at busy locations, are generally not inclined to take the trouble to write up a report after they have dealt successfully with an unsatisfactory situation, even when that situation is repetitive;

c) Problems at sites are not always evident to the Regional Office, unless and until some dangerous incident produces a complaint and/or special investigation. We found it very useful to pose a series of direct questions, separately, to Tower Chiefs and Aeradio Operations Supervisors. Comparison of the responses was a very good 'indicator' of trouble;

d) From those responses, it was found at some sites that one 'side' didn't really know what the other 'side' was doing. For example, at one site, Aeradio said that the Tower was NOT involved in any traffic advisory to aircraft outside the PCZ, but the Tower said that they DID provide traffic advisory to anyone who called up, and in particular, to aircraft using two small aerodromes well outside the PCZ. Initially, both units indicated that there was no conflict in their relationship - because they were not aware of the conflicts. From the user viewpoint, this traffic advisory service from either Tower or Aeradio was ineffective and unreliable, since both units were unknowingly 'competing' in the same airspace."

(Emphasis added.)

Mr. Black defended his conclusion. He testified that he instructed two members of his team to "get on the phone" with their regional counterparts and to draw recent audit reports. He also asked them to do a file search. All of this was designed to determine whether there was evidence in other regions of incidents which would justify conducting a national study. Only one incident of minor consequence was turned up. No record was kept of the response from the regions, and Mr. Black frankly admitted that in retrospect he should have sent the report to other regions. He testified as follows:

> "In hindsight or in retrospect I think I would have to agree that I should have sent the reports out to the regions so they could have examined them in detail. I can assure you, had I known, I wouldn't have been appearing before this Commission of Inquiry, that would have been done. But I accept responsibility for that decision."

Mr. Black further explained that militating against a more comprehensive study was the existence of a project team studying the role of the flight service stations (FSS) and flight service specialists. The project was entitled "Flight Information Service Stations" (or FISS). The implementation of a TASA-like concept required coordination between two units, namely, Telecom and Air Traffic Control. This matter had been under study for some years and was being studied by the FISS project team. It was Mr. Black's view that no major changes should be made until this study had been completed.

The objections expressed by Mr. Douglas were of no avail, and the matter was temporarily closed by a memorandum from Mr. R. L. Bolduc, Director Aeronautical Licensing and Inspection, to the Director, Civil Aviation, dated July 25, 1977. Mr. Bolduc said in part:

> "It is considered that the work of this Project Team is complete and a copy of their report is attached. Any further work can best be accomplished by normal line organizations.
>
> Subject to your approval, all documents related to this subject will be turned over to the Flight Information Service Station (FISS) Project Committee whose work is proceeding along parallel lines."

MANDATORY POSITION REPORTING (PX)

As has been earlier discussed in detail, on February 11, 1978 a PWA Boeing 737 crashed at Cranbrook, which is an uncontrolled airport in the Pacific Region. The aircraft was destroyed on impact and 42 occupants were killed. The accident report, reproduced in detail in Volume 1, contained, amongst others, the following conclusions:

> "3.1 The estimated time of arrival of the aircraft at Cranbrook, calculated by Calgary ATC, and used by Aeradio for advisory purposes was considerably in error and resulted in a traffic conflict between the arriving aircraft and a vehicle working on the runway.
>
> 3.2 The flight crew did not report by the Skookum beacon on final approach, as was the normal practice at Cranbrook, thereby allowing the incorrect ETA to remain undetected.
>
> 3.3 Regulatory provisions concerning mandatory pilot position reporting during instrument approaches were inadequate.

3.4 <u>The interfaces between the organizations providing Air Traffic Services, Telecommunications (Aeradio) and Airports Services were not well enough developed to provide a reliable fail safe flight information service</u>."
(Emphasis added.)

Pertinent to conclusion 3.1 is the following extract from the report:

"<u>Communications</u>

...

Calgary ATC sent an ETA '2005' which was acknowledged by the Cranbrook Aeradio operator on duty; viewed as an element to control vehicular traffic on the runway, this estimate was in error by ten minutes, since the aircraft touched down at 1955. However, from the point of view of ATC, the estimate was for air traffic control purposes only. The ATC procedures manual MANOPS makes no reference to any other purpose for the ETA other than for traffic separation. The same manual (sec. 392.1) refers to the ETA as 'estimated time of arrival over the approach aid to be used'. In this sense the ETA generated by Calgary ATC was even further in error."

Although the first officer communicated with the aeradio operator (FSS) approximately 10 minutes before landing, he did not report by the Skookum beacon in accordance with normal practice. In a memorandum dated April 21, 1978, Mr. W. M. Howes, who was the Chief Investigator, advised Aviation Safety Analysis as follows:

"Our investigation into 'interfaces and legislation, etc.' makes us realize that there are barriers in the present legislation/regulations that would prevent 'legal' application of the recommendations made by the Committee. <u>Nevertheless, we consider the Edmonton recommendations very common sense and can state that if they had been applied in Cranbrook there they would probably have prevented the accident</u>.

<u>We therefore recommend that ASA undertake to promote the intent of the recommendations made by 'The Committee on ATS Operational Interface with Aeradio Stations' as expressed in their Edmonton report of June 9, 1976, file 5202-2, with a view to their practical application on a nation-wide basis</u>."
(Emphasis added.)

Mr. Black countered by a memorandum to the Director General, Civil Aviation, dated February 18, 1978:

"Thirdly, the statement made in ASI memorandum that the accident would probably not have occurred had the Edmonton recommendations been applied, is simply not factual. We did not contemplate at that time making position reports mandatory by law. As you know, these are recommended practices both here and in the U.S.A., based on common sense and good airmanship. I believe the fundamental question in this case is where does airmanship end and regulation begin? I have reviewed the circumstances associated with the accident as well as the recommendations contained in the Western Region report and can find no justification for the statement contained in ASI's memorandum."

The mandatory frequency guidelines, which were published on June 5, 1979, and which will be reproduced in full and discussed in detail later, included in part the following advice on position reporting:

"IFR Arrival Procedures at Uncontrolled Airports

The pilot-in-command of an aircraft operating under Instrument Flight Rules and intending to conduct an approach at an uncontrolled aerodrome shall, unless otherwise instructed by Air Traffic Control make the following reports:

a) five minutes prior to estimated time of commencing the approach procedure, including in this report approach intentions and estimated time of landing;

b) upon passing the fix with the intention of conducting a procedure turn, or, if no procedure turn is intended, upon first interception of the final approach track;

c) upon passing the final approach fix during the final approach or three minutes before the estimated time of landing where no final approach fix exists, (approach facility on the aerodrome); and

d) in the event of a missed approach, as soon as practical after commencing the missed approach, including in this report a statement of intentions."

ANO V, No. 11, reproduced in full later, which was enacted to clarify, expand and make mandatory a pilot's obligation to provide IFR flight position reports at uncontrolled airports places the following duty on a pilot who is approaching an uncontrolled airport with the intention of landing:

"7. Where the pilot-in-command intends to conduct an approach to or a landing at an uncontrolled aerodrome, he shall report, on the appropriate frequency,

(a) his approach intentions and estimated time of landing five minutes prior to the estimated time of commencing the approach procedure;

(b) his position when passing the fix outbound with the intention of conducting a procedure turn, or, if no procedure turn is intended, when he first intercepts the final approach track;

(c) his position when passing the final approach fix during the final approach or three minutes before the estimated time of landing where no final approach fix exists;

(d) his intention when commencing a circling manoeuvre;

(e) his position when turning on the final approach path to the runway or landing path; and

(f) his intentions as soon as practicable after commencing a missed approach."

As has been noted, the fatal accident at Cranbrook occurred on February 11, 1978. The flight crew did not report by the Skookum beacon on final approach. Although as the evidence disclosed it would have been good airmanship to have done so, there was no mandatory requirement for such a report at the time of the Cranbrook accident.

The mandatory frequency guidelines were published on June 5, 1979. If the position reporting had been made mandatory prior to the Cranbrook accident, there might have been at least a greater awareness on the part of the crew of the obligation to do so. If such a report had been made, it appears probable that the snow removal equipment could have been removed from the runway, or that the pilot could have been warned earlier to initiate a go around, and the accident could have been avoided.

THE MANDATORY FREQUENCY GUIDELINES

"COMMUNICATIONS PROCEDURES AT UNCONTROLLED AERODROMES

An UNCONTROLLED AERODROME is an aerodrome without a control tower in operation. Many aerodromes have towers which operate only part of the time, and these are uncontrolled aerodromes during the time when the tower is not in operation.

General Considerations

Aircraft operations on, or in the vicinity of uncontrolled aerodromes can present a number of problems, some of which have the potential for conflict. In the absence of air (and ground) traffic control, if there is inadequate exchange of information concerning the movement of aircraft, and of aerodrome maintenance equipment, situations detrimental to safety can develop.

Safety can be enhanced if pilots report their positions and intentions in an orderly way, and monitor a common radio frequency while operating within a prescribed distance of uncontrolled aerodromes.

The operation of vehicles on runways is essential to maintain aerodromes in a safe operational status. Consequently, it is imperative in the interests of safety that information concerning a pilot's landing or take-off intentions be conveyed to aerodrome authorities so that removal of the vehicles can be effected.

At aerodromes served by public air-ground communications stations, these facilities coordinate vehicle activity - but they must be aware of aircraft activity in order to do an effective job. Flight Service Stations (FSS) and Community Airport Radio Stations (CARS) provide a Vehicle Advisory Service (VAS) in conjunction with Airport Advisory Service (AAS).

There are some uncontrolled aerodromes which are served indirectly by a FSS, by means of a Remote Communications Outlet (RCO). RCO are primarily established for enroute communications purposes, but there are a few with the added capability of providing AAS and VAS. Where this capability exists the (remote) FSS will coordinate removal of vehicles from the runway. It is important for pilots to remember that the operator of the RCO is some distance away and cannot see what is going on. The Flight Service Specialist can only pass on information that he has been given by radio.

One important function of FSS, certain RCO and CARS is Airport Advisory Service (AAS). AAS information provided to pilots includes all or part (depending on relevance to the pilot's intentions) of the following:

- wind direction and speed
- favoured runway
- altimeter setting
- weather
- other pertinent KNOWN air traffic
- runway condition
- aerodrome vehicle traffic
- NOTAM concerning local facilities.

It should be noted well that a Flight Service Specialist can provide information on other aircraft only when he has been advised of their presence and intentions. He will not be aware of NORDO aircraft, or even of some

radio-equipped aircraft operating in the vicinity, unless the pilots have advised him of their activities.

Establishment of Mandatory Frequencies

To enhance the safety of operations on, and in the vicinity of uncontrolled aerodromes, Transport Canada will be designating a MANDATORY FREQUENCY (MF), for use by all radio-equipped aircraft on the ground or arriving and departing and within a specified distance (normally 20NM) of selected aerodromes.

This will ensure that all radio communications, which are relevant to local air activity in the area of concentration around the aerodrome, will be transmitted - and monitored by all concerned - on a common frequency. Where applicable, this frequency will be the AAS frequency. The general plan is attached as an Appendix to this Circular. There will probably be some exceptions to the plan, but, for each aerodrome where a MF is designated, the specific MF, distance and call sign or service available will be published in bold print in the IFR, VFR and Northern Supplements. Below are a few examples:

MF 122.1 - 20 NM/RADIO

MF 122.8 - 20 NM/UNICOM

MF 122.4 - 20 NM/COMMET

MF 122.4 - 20 NM/APT RDO

MF 126.7 - 20 NM/BROADCAST

Where UNICOM has been designated as the MF the pilot is cautioned to ascertain the correctness of the information he has received.

The designated MF at some aerodromes will be the COMMET frequency. A COMMET is a ground communications station operated for the Minister for the purpose of passing weather and other related information to aircraft.

Use of Mandatory Frequency

There is no substitute for keeping a good lookout while flying in visual weather conditons, and this is particularly true in the vicinity of uncontrolled aerodromes. The effective use of radio, however, can greatly increase the level of flight safety.

All pilots operating radio-equipped aircraft at uncontrolled aerodromes for which a MF has been published will be required to transmit certain position reports on the MF in accordance with the procedures which are outlined in detail later in this Circular.

Position reports described in this Circular have two formats; either a Directed Transmission, made to a ground station, or a Broadcast (Transmission) which is made to advise all concerned of the pilots intentions. Wherever the MF is operated by a ground station the initial transmission should be directed to the station.

e.g. 'Muskoka Radio - this is CF-XYZ
20 miles south at 35, 3000' VFR
Request weather and traffic advisory. Over'

Thereafter, the required transmissions may be in the form of a BROADCAST, depending on the traffic situation.

e.g. 'CF-XYZ is joining the left hand downwind leg for Runway 36 at Muskoka.'

Should there be no acknowledgement of any transmission then all subsequent radio reports should be made in the BROADCAST format. Where no ground station exists all reports shall be broadcast blind.

After initial contact with a ground station is established on the MF, the decision to use either a directed transmission or a broadcast rests with the pilot based on his assessment of the traffic situation.

e.g. Broadcast: 'CF-XYZ is by the Muskoka Beacon on final - landing on Runway 18,' or

Directed Transmission: 'Muskoka Radio, CF-XYZ is by the Beacon inbound. Say again the surface wind.'

IFR Arrival Procedures at Uncontrolled Airports

The pilot-in-command of an aircraft operating under Instrument Flight Rules and intending to conduct an approach at an uncontrolled aerodrome shall, unless otherwise instructed by Air Traffic Control make the following reports:

a) five minutes prior to estimated time of commencing the approach procedure, including in this report approach intentions and estimated time of landing;

b) upon passing the fix with the intention of conducting a procedure turn, or, if no procedure turn is intended, upon first interception of the final approach track;

c) upon passing the final approach fix during the final approach or three minutes before the estimated time of landing where no final approach fix exists, (approach facility on the aerodrome); and

d) in the event of a missed approach, as soon as practical after commencing the missed approach, including in this report a statement of intentions.

In some cases, ATC will instruct the pilot to remain on a control frequency rather than transferring him to the MF. When there is an FSS or RCO, ATC will advise the FSS of the delay and an estimated position of the aircraft. At other locations where there is no communications link between the ATS unit and the operator of the MF, ATS will transfer communications as soon as possible.

<u>VFR Arrival Procedures at Uncontrolled Airports</u>

<u>The pilot-in-command of a radio-equipped aircraft operating under Visual Flight Rules, and intending to land at an uncontrolled aerodrome shall make the following reports</u>:

a) immediately prior to reaching the distance associated with the mandatory frequency, including in this report his position, altitude, arrival procedure intentions and estimated time of landing;

b) upon joining the circuit pattern; and

c) when established on the final approach.

<u>Departure Procedures - All Aircraft</u>

Pilots intending to take-off from an uncontrolled aerodrome shall:

a) report his departure procedure intentions prior to moving onto the runway;

b) ascertain both by radio and by visual observation, that no conflict with other aircraft or with vehicles is likely to occur during the take-off, and thereafter

c) maintain a listening watch on the MF until beyond the distance associated with the MF unless otherwise instructed by ATC.

Where IFR departures are required to contact an IFR control unit after take-off it is recommended that, if the aircraft is equipped with two radios, the pilot should also monitor the MF during his departure.

Ground Operating Procedures

Any person operating a radio-equipped aircraft on the ground at an uncontrolled aerodrome, but not intending to take-off, shall, prior to entering a runway:

a) advise his intentions on the MF; and

b) ascertain both by radio and by visual observation that no conflict with other aircraft or with vehicles is likely to occur during the intended operation; and

c) maintain a listening watch on the MF while on the aerodrome.

IFR Procedures at Uncontrolled Aerodromes in Uncontrolled Airspace

Pilots operating IFR in uncontrolled airspace should, whenever practical, monitor 126.7 MHz and broadcast their intentions on this frequency immediately prior to changing altitude or commencing an approach. Therefore, when arriving at aerodromes where another frequency is designated as the MF, descent and approach intentions should be broadcast on 126.7 MHz before changing to the MF. If conflicting IFR traffic becomes evident this change should be delayed until the confliction is resolved.

Pilots departing IFR shall broadcast intentions on 126.7 MHz in addition to the MF prior to take-off. It is strongly recommended that 126.7 MHz be monitored along with the MF if the aircraft is equipped with dual VHF Radios.

VFR Arrivals and Departures NORDO

Pilots of NORDO aircraft must be extremely vigilant since neither the other aircraft nor the aerodrome service vehicles can be alerted of their presence. It is recommended that arriving aircraft fly a full circuit so that runway availability and traffic can be visually ascertained. Departing pilots shall ensure that the runway is clear and that there are no aircraft on final prior to moving on to the runway. Whenever practical, the FSS or CARS should be informed of intentions when flight planning.

Implementation Dates

Many of the foregoing procedures represent what is considered to be good airmanship and common courtesy when operating at uncontrolled aerodromes and should be standard practice at all times.

Mandatory Frequencies will begin to appear in the VFR, IFR and Northern Supplements and become effective when published in these documents. It should be noted that the Radio Frequency Boxes in CAP will be amended at rapidly as production schedules permit. In the interim pilots should refer to the Supplements for the appropriate Mandatory Frequencies.

THE CHANGE TO 126.7 MHz FOR ENROUTE IFR FLIGHT IS EFFECTIVE JUNE 14, 1979."
(Emphasis added.)

AIR NAVIGATION ORDER, SERIES V, NO. 11

"AIR NAVIGATION ORDER, SERIES V, NO. 11

ORDER RESPECTING IFR FLIGHT POSITION REPORTS

Short Title

1. This Order may be cited as the IFR Flight Position Reports Order.

Interpretation

2. In this Order,
'appropriate frequency' means

(a) the VHF frequency specified by an air traffic control unit for use by the pilot-in-command,

(b) at or near an aerodrome for which a mandatory frequency has been designated, that frequency, or

(c) in any case not described in paragraph (a) or (b), the frequency assigned to an aerodrome or an air space in the Canada Air Pilot, the IFR Supplement, the VFR Supplement or the Northern Supplement; (frequence appropriee)

'broadcast' means a radio transmission that originates from an aircraft and that is not directed to any particular receiving station; (diffusion)

'ground station' means a location on the ground, other than an air traffic control unit, equipped with radio transmitting and receiving equipment capable of two-way voice communications with an aircraft; (station au sol)

'mandatory frequency (MF)' means a VHF frequency designated for the use of radio-equipped aircraft operating on the surface of or in the vicinity of an aerodrome and that is listed as such in the Canada Air Pilot, the IFR Supplement, the VFR Supplement or the Northern Supplement; (frequence obligatoire)

'uncontrolled aerodrome' means an aerodrome without an air traffic control tower in operation (aerodrome non controle)

Application

3. This Order applies to the pilot-in-command of an aircraft operating under instrument flight rules (IFR).

General

4. (1) At an uncontrolled aerodrome, every report required by sections 5 and 7 shall be

(a) made to a ground station associated with that aerodrome, or

(b) where no ground station exists, broadcast.

(2) When a ground station fails to acknowledge a radio transmission directed to it from an aircraft, all further reports that would normally be directed to that ground station shall be broadcast.

(3) When the broadcast referred to in subsection (2) has commenced and a ground station responds to that broadcast, the broadcast shall be terminated and all other relevant communications shall be directed to that ground station.

Reports on Departure

5. (1) Where a pilot-in-command intends to take off from an uncontrolled aerodrome, he shall

(a) report on the appropriate frequency his departure procedure and intentions before moving on to the runway or before aligning the aircraft on the take off path; and

(b) ascertain by radio on the appropriate frequency and by visual observation that no other aircraft or vehicle is likely to come into conflict with the aircraft during take-off.

(2) The pilot-in-command shall maintain a listening watch

(a) during take off from an uncontrolled aerodrome; and

(b) after take off from an uncontrolled aerodrome for which a mandatory frequency has been designated, until the aircraft is beyond the distance or above the altitude associated with that frequency.

(3) soon as possible after reaching the distance or altitude referred to in subsection (2), the pilot-in-command shall communicate with the appropriate air traffic control unit or a ground station on the appropriate enroute frequency.

Enroute Reports

6. Where, pursuant to section 550 of the Air Regulations, a positon report is required over a designated reporting point, that report shall be transmitted to the appropriate air traffic control unit and include information in the following order:

(a) the flight or aircraft identification and radio call sign if different from the flight or aircraft identification;

(b) the position of the aircraft;

(c) the time over the reporting point in Greenwich Mean Time;

(d) the altitude above sea level or flight level;

(e) the type of flight plan that has been filed;

(f) the name of the next designated reporting point and the estimated time over that point in Greenwich Mean Time;

(g) the name only of the next succeeding reporting point along the route of flight; and

(h) such additional information as may be requested by the appropriate air traffic control unit or deemed relevant by the pilot-in-command.

Reports prior to landing

7. Where the pilot-in-command intends to conduct an approach to or a landing at an uncontrolled aerodrome, he shall report, on the appropriate frequency,

(a) his approach intentions and estimated time of landing five minutes prior to the estimated time of commencing the approach procedure;

(b) his position when passing the fix outbound with the intention of conducting a procedure turn, or, if no procedure turn is intended, when he first intercepts the final approach track;

(c) his position when passing the final approach fix during the final approach or three minutes before the estimated time of landing where no final approach fix exists;

(d) his intention when commencing a circling manoeuvre;

(e) his position when turning on the final approach path to the runway or landing path; and

(f) his intentions as soon as practicable after commencing a missed approach.

8. Where the pilot-in-command intends to conduct an approach to or a landing at a controlled airport, he shall make all reports as directed by the appropriate air traffic control unit.

Amendment No. 77
July 28, 1981"

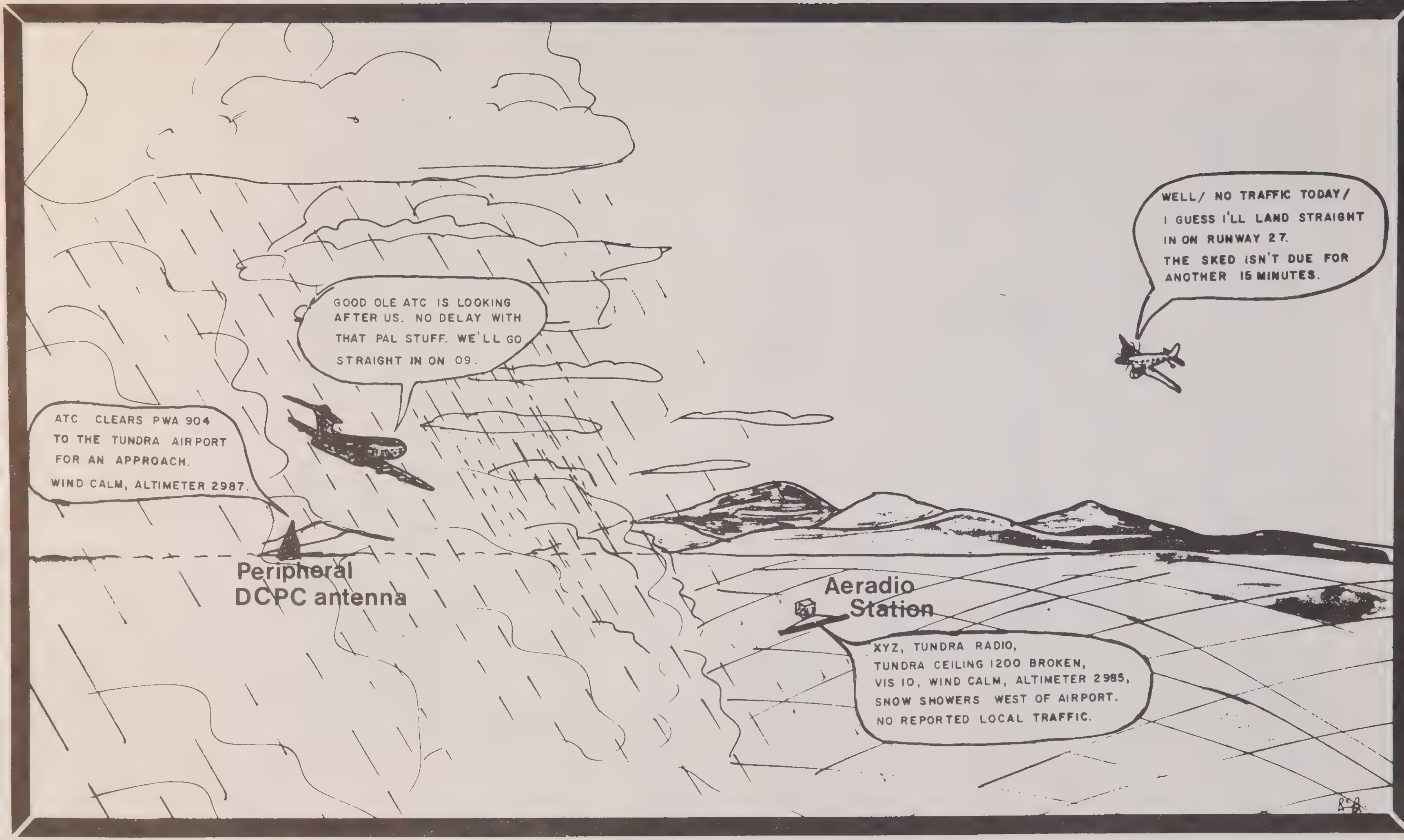
(Emphasis added.)

CRITIQUE OF MANDATORY FREQUENCY GUIDELINES AND ANO V, NO. 11

As I have previously pointed out, the problem to which the mandatory frequency guidelines and ANO V, No. 11 has been addressed appears to have been first identified in the Western Region which had first initiated a proposed solution. In the draft report prepared by the Western Region on the mandatory frequency guidelines, the following statement of the problem to be resolved was set forth as follows:

> "Aircraft operations on, or in the vicinity of uncontrolled aerodromes can present a number of problems, some of which are potentially very hazardous. In the absence of air (and ground) traffic control, inadequate exchange of information concerning the movement of aircraft, and of aerodrome maintenance equipment, poses unacceptable risks for all concerned."
> (Emphasis added.)

Mr. McDonell provided the following pictorial illustration of the problem:


ATC CLEARS PWA 904 TO THE TUNDRA AIRPORT FOR AN APPROACH. WIND CALM, ALTIMETER 2987.
GOOD OLE ATC IS LOOKING AFTER US. NO DELAY WITH THAT PAL STUFF. WE'LL GO STRAIGHT IN ON 09.
Peripheral DCPC antenna
Aeradio Station
XYZ, TUNDRA RADIO, TUNDRA CEILING 1200 BROKEN, VIS 10, WIND CALM, ALTIMETER 2985, SNOW SHOWERS WEST OF AIRPORT. NO REPORTED LOCAL TRAFFIC.
WELL/ NO TRAFFIC TODAY/ I GUESS I'LL LAND STRAIGHT IN ON RUNWAY 27. THE SKED ISN'T DUE FOR ANOTHER 15 MINUTES.

Studies subsequent to the Cranbrook accident demonstrated that the problem identified in the studies undertaken in the Western Region and headed by Mr. McDonell, previously referred to, was not peculiar to that region. The problem was one inherent in the system. A subsequent study by an ad hoc committee from the Pacific Region entitled "Study of Communication Interface at Uncontrolled Airports", dated July 11, 1978, summarized the TASA experience in the following language:

> "Western's unilateral solution to the identified problems consisted of:
>
> 1. An operational directive from the Edmonton ACC whereby communication with all inbound IFR aircraft was to be transferred at 20 NM from the airport to the appropriate agency (tower or aeradio station).
>
> 2. Where specific interface problems were identified at certain airports between the tower and aeradio station (Inuvik) or between the aeradio station and the PAL-DCPC (Fort McMurray) a local inter-unit agreement was established which clearly delineated lines of responsibility as to what service/control was provided to whom and by whom.
>
> <u>The essence of their solution was to get all aircraft within a certain graphical area (20 NM from the airport) on a common frequency, talking to one agency. After some initial jurisdictional and procedural problems, this solution seems to have worked well at resolving the conflicts at these airports</u>."
> (Emphasis added.)

The report continued in part as follows:

> "The Committee's objective was not to 're-invent the wheel'. After an initial meeting we felt that the problem areas were so obvious that someone must have identified them before now. It was at that time that the Committee's attention was drawn to a 1976 publication of the Western Region entitled 'Aeradio Flight Advisory Services vs ATS Peripheral DCPC'.
>
> <u>Although specific conflicts identified in that report have not as yet been clearly identified in the Pacific Region (information is now being collected in those areas), the same deficiencies and potential problem areas exist because this Region functions within the same CATA system as does Western Region. It is strongly recommended that Western Region's report be studied in conjunction with this report. In fact, this is essentially an expansion of that report. New ground covered by this report centres on communication procedures between Aeradio Stations and vehicles on airports.</u>
>
> . . .

Secondly, the problems identified in this report are not new. The solutions recommended are not original. This Committee was not concerned with whether or not a particular recommendation may have been rejected in the past. The point is that the problems persist. The recommendations propose viable courses of action that should be considered - or reconsidered, particularly in the light of changing aviation realities."
(Emphasis added.)

In September 1978 a meeting was held by headquarters to review regional concerns. Five teams were set up to deal with five separate problem areas. Team one was organized to deal with communications procedures at uncontrolled aerodromes. Team one brought forward a plan for mandatory frequencies which is a variation of the Western Region's TASA concept. This eventually resulted in an information circular 0/4/79 entitled "Communications Procedures at Uncontrolled Aerodromes".

Regional personnel, although supporting the mandatory frequency concept, expressed serious reservations about some aspects of it. The Western Region took the lead in this regard. In a brief presented on behalf of the Western Region by Mr. McDonell, issue was taken with the manner in which the plan was initiated. They objected to the apparent disregard of the views of the Western Region.

In November 1979, two incidents occurred at the Inuvik NWT airport, which, according to Mr. McDonell, demonstrated that notwithstanding the implementation of the mandatory frequency plan, serious communication problems continued to exist.

The MF guidelines, by their terms, apply only to uncontrolled airports. They do not have any application when a control tower is in operation. They are limited in their application to aircraft arriving, departing an airport, or operating on the ground. They do not have any application to aircraft which are transiting the area associated with the mandatory frequency. They have no application to non-radio equipped aircraft (NORDO), although these aircraft are cautioned to be extremely vigilant since neither the other aircraft nor aerodrome service vehicles can be alerted of their presence. Generally, the intent of these guidelines is to require all aircraft within a specified distance (normally 20 nautical miles) of selected aerodromes to monitor and communicate on a common frequency.

The Air Navigation Order is applicable only to IFR aircraft at uncontrolled airports. IFR aircraft must report their arrival or departure to a ground station or, in the absence of a ground station, must broadcast their intentions.

All the interested parties who appeared before the Commission were supportive of the mandatory frequency plan as a concept. However, they made many constructive criticisms and suggestions for improvements, and Mr. Black very fairly acknowledged the validity of some of them and undertook to consider others.

Operating experience with the guidelines will no doubt uncover other deficiencies and bring to light improvements that can be made. As suggested by CALPA, a further meeting should be held similar to the meeting which was held on February 12, 1980 at which 30 representatives from Transport Canada and 12 aviation associations were present. This would make available to Transport Canada the operating experience of the industry to date. Furthermore, it would enable Transport Canada to invite representatives from the Regions to ensure that regional views are obtained. This would allay the dissatisfaction expressed by regional personnel with respect to the manner in which the guidelines were adopted.

I set out hereunder some of the principal alleged deficiencies which were submitted to the Commission:

FAILURE TO ADDRESS ALL TRAFFIC CONFLICT AND THE ABSENCE OF A VERTICAL CAP

The mandatory frequency (MF) guidelines and the Air Navigation Order Series V, No. 11 (ANO) fail to address many traffic conflicts which may occur at uncontrolled airports. The guidelines are limited to aircraft landing, taking-off or operating on the ground. Section 6 of the ANO V, No. 11 simply enlarges on the information which an IFR pilot is already obliged to report to a controller pursuant to section 550 of the Air Regulations. Section 550 provides as follows:

"(1) During IFR flight, position reports to the appropriate air traffic control unit shall be made over such reporting points as are designated by the Minister and over such other reporting points as are specified by the appropriate air traffic control unit.

> (2) Where no reporting points for IFR flight are designated by the Minister, position reports during IFR flight shall be made to the appropriate air traffic control unit at such intervals and at such locations as are specified by such unit."

Aircraft transiting the area associated with MF are unaffected by either the guidelines or the ANO. This means that local traffic or enroute traffic which may conflict with traffic that is landing or taking-off may not be communicating with the flight service stations. The potential conflicts are neatly summarized in a Discussion Paper dated March 27, 1980 prepared by the Western Region and forwarded to headquarters on April 11, 1980 as follows:

"<u>Activity Not Subject To MF</u>		<u>Activity Subject To MF</u>	
1.	VFR Enroute (low altitude)	A.	IFR Arrival (MF Aerodrome)
2.	VFR Arrival (nearby aerodrome)	B.	IFR Departure (MF Aerodrome)
3.	VFR Departure (nearby aerodrome)	C.	VFR Arrival (MF Aerodrome)
4.	VFR Local (same or nearby aerodrome)	D.	VFR Departure (MF Aerodrome)
5.	IFR Enroute (low altitude)		

The various potential conflicts (within the specified distance), which are not taken into account by 0/4/79 are as follows:

1 vs A	2 vs A	3 vs A	4 vs A	1 vs 1	2 vs 2	3 vs 3
1 vs B	2 vs B	3 vs B	4 vs B	1 vs 2	2 vs 3	3 vs 4
1 vs C	2 vs C	3 vs C	4 vs C	1 vs 3	2 vs 4	3 vs 5
1 vs D	2 vs D	3 vs D	4 vs D	1 vs 4	2 vs 5	4 vs 4
			5 vs C	1 vs 5		4 vs 5
			5 vs D"			

Under the heading "General Considerations" pilots are advised that:

> "Aircraft operations on, or in the vicinity of uncontrolled aerodromes can present a number of problems, some of which have the potential for conflict. In the absence of air (and ground) traffic control, if there is inadequate

exchange of information concerning the movement of aircraft, and of aerodrome maintenance equipment, situations detrimental to safety can develop.

Safety can be enchanced if pilots report their positions and intentions in an orderly way, and monitor a common radio frequency while operating within a prescribed distance of uncontrolled aerodromes."
(Emphasis added.)

This creates the false impression that all aircraft operating in the vicinity of the airport are reporting their positions and intentions and are monitoring a common frequency. Thus pilots may be imbued with a false sense of security because they may well assume from the publicity surrounding the implementation of the guidelines and from the language of the guidelines that all aircraft are communicating on a common frequency. As demonstrated above, many aircraft are not.

Mr. Frank C. Black, the representative of the Air Administration who was primarily responsible for the implementation of the guidelines, gave as the main reason for not extending their application the increased workload it would cause to the pilots of enroute aircraft, particularly where there is a profusion of MF zones. Furthermore, there might be an objection on the part of controllers who temporarily lose communication with the pilot when he switches to the MF frequency.

Mr. Black conceded that the added workload may be justified in light of the disadvantages inherent in the present setup. He gave the following testimony when examined by Commission Counsel:

"Q Well, why wouldn't you just provide that VFR en route aircraft have to switch to the mandatory frequency in the same way as the TASA required them to communicate with the ground station?

A Primarily because of the pilot work load aspect. I'm not saying that I favour that, but that is the view that was expressed. It may very well be that a CAP under certain circumstances is the answer, but under other circumstances in a different area of the country, the CAP imposes too much of a burden and this is the area that we're grappling with now.

Q Well, don't you think that maybe it would be justified, the additional burden would be justified because people are going to get the idea that once they are in this MF zone that there is a certain measure of safety that the ground station knows where everybody else is and, lo and behold, they've got people flying through that don't have to report to the ground station?

A Yes.

. . .

Q . . . We had a very graphic description of a very dangerous situation at Sioux Lookout where there are three aerodromes all in close proximity and MF is in place there, as I understand it, and with respect to the water base and the natural resources base, pilots are happily landing and taking off there and not paying any attention at all to the FSS. In the meantime others who are landing and departing from, at the Sioux Lookout Airport are. And they, no doubt, think this MF plan is giving them some measure of security because people know where these aircraft are and, in fact the FSS says I haven't got the foggiest these people are landing and taking off without paying any attention.

A I think the ultimate solution to that problem rests in the promulgation of ANO V, 34, which says or should say, to satisfy that problem - all aircraft operating within the MF zone VFR under -- well, all aircraft operating in the zone, we are talking VFR spectrum now, shall abide by the information circular and have functioning two-way radio.

. . .

MR. SOPINKA: So this would amend the information circular in two respects: first of all it would apply to all aircraft that are flying VFR; and, secondly, it would apply to all aircraft passing through the MF zone whether they are landing or taking off at that airport or not?

A If in fact the decision is made to establish a cap on the MF zone. In other words, the cylinder that has been advocated and that is still the subject of controversy."
(Emphasis added.)

The cap referred to above is a ceiling of the MF area, so that it is a cylinder having a radius of 20 NM and a fixed height. A cap was strongly recommended by Mr. Douglas E. McDonell and his colleagues of the Western Region. In the following excerpt from a memorandum, dated January 30, 1979, to Mr. Donald E. Lamont, Mr. D. J. Douglas, of the Western Region, submitted:

> "Referring to the Minutes of Team 1 meeting on November 27, 1978, our comments regarding Item 1 - the frequency plan - are covered in the attached copy of memorandum to WTE. In Item 2 b), it is stated - 'It was agreed the area could not be capped'. We disagree. It can be capped, and quite easily. The debatable point is whether it should be capped or not. The principal advantage in capping would be to reduce unnecessary congestion on the MF. Aircraft (IFR or VFR) above a certain altitude are unlikely to pose any conflict for arriving/departing/local traffic, and certainly not for vehicles. It would be better to have such overflights (above, say - 9,500) remain on the Enroute Advisory frequency."

The cap would relieve those outside of it from complying with the reporting provision of the MF plan. Most enroute IFR aircraft are flying at a sufficient altitude to avoid conflict with aircraft taking-off, landing or manoeuvring in the vicinity of the aircraft. The cap can be fixed to ensure that those required to comply with the MF provision are in the area of serious potential conflict. An additional benefit of the cap is to relieve the mandatory frequency of these communications, thus reducing the congestion that is a constant problem. The workload of the pilot envisaged by Mr. Black may not turn out to be a major problem. This can only be determined on the basis of actual operating experience as suggested by Mr. Black as follows:

> "I don't know the answer to the problem. I think the only way that you can address it is to establish a clear cut criteria as to where MF zones will be implemented, get the regions to provide those airports in which they are designated MF zones and then see what that results in in terms of pilot work loads to see if the case stands up."

It should be noted in passing that a positive control zone is capped generally at an altitude of 3000 to 4000 ft. AGL, and no one has suggested that this creates any problems. Similarly, although there are apparently those who oppose the cap, no valid reason was advanced for such opposition.

APPLICATION OF MANDATORY FREQUENCY PLAN TO CONTROLLED AIRPORTS

The positive control zone (PCZ) is an area generally having a radius of 5 to 10 miles from the airport. At those airports having both flight service stations and control towers in operation at the same time, all aircraft within this zone must

communicate with the controller and are under his control. Outside of this positive control zone however there is what has been described as a "no man's land". The flight service specialist is regarded as having the responsibility for providing traffic advisory service to all aircraft. Beyond the positive control zone the tower controller is interested in the traffic in the vicinity immediately outside of the positive control zone and does provide traffic advisory service to callers in this area. In addition, an IFR aircraft may be communicating with a remotely situated controller, either directly or through a PAL. As a consequence, in this area outside of the positive control zone, where there is considerable activity of aircraft arriving at and departing from the airport, some are communicating with the controller and others are communicating with the flight service specialist, and there is no provision for coordination between them. Therefore, in the area immediately outside of the positive control zone, the conflicts that gave rise to the MF plan continue to exist in this "no man's land".

Mr. Black agreed that the conflict is there. He was cross-examined as follows by Commission Counsel:

> "Q Within the 20-mile nautical radius of an airport with a tower and outside of the positive control zone the mandatory frequency provisions do not apply?
>
> A That's correct.
>
> Q <u>And so you can have the situation, aircraft within that 20-mile zone and not within the positive control zone, the IFR aircraft are communicating, say, through a PAL to a controller and VFR aircraft are communicating with an FSS</u>?
>
> A <u>That's correct</u>.
>
> Q <u>That's the very conflict that was identified -- one of the conflicts</u>?
>
> A <u>That's right</u>.
>
> Q <u>Now the mandatory frequency plan was designed to eliminate that conflict so that there would be communication to one central agency</u>?
>
> A <u>In an area where there is no control tower</u>.

Q That's the way it works but I am suggesting to you that the conflict exists when there is a control tower?

A That's right."
(Emphasis added.)

The TASA concept which was so successful in the Western Region met this problem by requiring that aircraft within the TASA zone around the airports communicate with the FSS when the tower was not in operation and with the tower controller when the tower was in operation. Mr. Black would adopt a similar solution but with, perhaps, a reduced positive control zone, depending on the nature of the traffic and the potential for conflict. He was asked the following questions and gave the following answers:

"Q And you have done nothing in the MF plan to eliminate that conflict outside the Positive Control Zone?

A That's a recognized fact. This is why I am suggesting to you that the way to eliminate it is to extend the size of the PCZ so you have one entity doing --

MR. COMMISSIONER: You would have to extend it to 20 miles?

THE WITNESS: No, I don't think so.

MR. COMMISSIONER: You're going to have part of the area not within the positive control zone?

THE WITNESS: That's correct, Mr. Commissioner, but I am not convinced that the density of traffic out at 20 miles are any worse than they are en route. We have the situation en route today, have had them for many years, where aircraft are operating VFR and en route frequencies in conjunction with aircraft on peripheral frequency IFR. This is a fact of life, the see and be seen principle applies. I have thought about this quite a bit.

MR. COMMISSIONER: If you extend the Positive Control Zone to 10 miles you will be meeting only part of the problem, with the other limitations --

THE WITNESS: That's right."
(Emphasis added.)

As with the height of the cap, so with the size of the MF zone and the PCZ, the dimensions should be determined with reference to the activity and potential for conflict. In some regions the area of the common frequency can be larger than in

others. Indeed it may vary from airport to airport. Mr. W. T. Tweed and Mr. Lyle Coleman, who presented a brief on behalf of the Northern Air Transportation Association, which represents 90% of the air carriers operating north of the 60th parallel in the Yukon and Northwest Territories, supported the idea of a radius in excess of 20 miles. That may be justified on the basis of operating experience there. On the other hand, in the more populated areas a radius of this size would be impractical because of the over-congestion of the mandatory frequency that would be caused thereby.

USE OF AIR TRAFFIC CONTROL (ATC) FREQUENCIES

After the mandatory frequency guidelines had been published and were in use, serious objection was taken, particularly by CATCA, to the use of tower frequencies as a mandatory frequency when the tower is not in operation. The principal objection of CATCA was that the practice of using ATC frequencies, when the tower was not in operation, might lead to confusion in the pilot's mind whenever he received flight advisory information from a flight service specialist while on control tower frequency. As a result of these objections, on November 1, 1979 the then Minister of Transport suggested that use of ATC frequencies as the mandatory frequency be discontinued pending a further meeting with representatives of interested parties and asked that a report be prepared on the objections raised.

Meetings were held, pursuant to which a report was submitted by Transport Canada on March 13, 1980. That report, which very fairly and fully sets forth the competing views, with its conclusions, is set out hereunder:

> "One point which has been brought to our attention relates to the use of the Control Tower frequency as the MF after the tower has closed. Of 62 towers in Canada, 48 are closed during the quiet hours and an MF is designated for that period. The policy is to use the Control Tower frequency as the MF and have pilots contact the FSS where such is available, or broadcast blind where no ground station exists so as to inform other pilots in the area of one's intentions.
>
> Comments have been received from the Canadian Air Traffic Control Association (CATCA) that this practice might lead to confusion in a pilot's

mind whenever he received flight advisory information from the FSS on the Control Tower frequency. It is the opinion of CATCA that the tower frequency should not be used as the MF when the tower is closed.

Transport Canada considered several factors in selecting the tower frequency for use as the MF:

(a) tower frequencies are well protected against interference from other stations operating on the same frequency whereas FSS frequencies are not so protected,

(b) Should a pilot call on the tower frequency when the tower is closed, the FSS specialist will hear the call and will inform the pilot that the tower is closed and supply the advisory service, thus no confusion should exist.

(c) the U.S.A. uses the tower frequency as the advisory frequency when the tower is closed and Transport Canada is trying, to the extent possible, to standardize procedures within North America, and

(d) the use of the tower frequency assures that the advisory frequency will not be occupied by pilots passing enroute position reports, filing flight plans, checking weather etc., that could jam the frequency at a critical time for pilots in the circuit.

In spite of the foregoing operational reasons for using the tower frequency, CATCA persisted in its objection and presented its case to your predecessor in October 1979. As a result of that meeting, your predecessor directed among other things that;

(a) further implementation of the mandatory frequencies using the tower frequency be held in abeyance,

(b) that meetings be commenced as soon as possible with representatives of interested parties, including the major Aviation Associations, in order to fully canvass the view of all Branches of Transport Canada as well as users of the system, and

(c) once this procedure has been completed, a decision would have to be made.

This meeting was held on February 11, 1980. The list of those in attendance is attached. There was unanimous support for Transport Canada's mandatory frequency policy, and except for the air traffic controllers, there was unanimous agreement that Transport Canada should use the tower frequency as the MF when the tower is closed during the quiet hours. The general consensus on this latter point from the users of the system, was that the reasons given by the Air Traffic Controllers for their position were not well founded.

As a consequence of the meeting, it is recommended that;

a) approval be given to resume publication of mandatory frequencies, including the use of tower frequencies when the tower is closed,

b) the Information Circular be amended to incorporate the suggestions that have been submitted by users and Aviation Associations, and

(c) the Canadian Air Traffic Control Association be advised that its concern in this matter is appreciated but that the operational requirements for using the tower frequencies outweigh its arguments to the contrary."

(Emphasis added.)

COMMENT

On the evidence before me, I am satisfied that the advantages to be derived from the use of ATC frequencies far outweigh the slight possibility of confusion. Any such confusion would be minimized if the flight service specialist informed the pilot that the tower is closed and the information being supplied is of an advisory nature only as was suggested in the report. If, in future, operating experience shows that pilots are in fact being confused, then the matter can be reconsidered.

LACK OF REGULATORY SUPPORT

The mandatory frequency guidelines were, as has been noted, published on June 5, 1979. They still remain as guidelines only and do not have the force of a regulation. ANO V, No. 11 came into force on September 24, 1980, but that order is only applicable to IFR traffic. VFR traffic is not yet governed by regulation. No valid reason was advanced why any of the provisions of the guidelines should not be made mandatory. Mr. Black did advise the Commission that there is in draft form ANO V, No. 34, which would deal with VFR reporting procedures. Priority should now be given to the enactment of such an order. While there is no assurance that Air Navigation Orders will always be complied with, the fact that they are mandatory would instil a greater consciousness of the duty to report, and the existence of a sanction should add an incentive to comply.

LACK OF GUIDANCE FOR PILOTS AT AERODROMES WITHOUT PUBLISHED MANDATORY FREQUENCIES

Many uncontrolled airports do not have a published mandatory frequency. In the brief prepared by Mr. McDonell, on behalf of the Western Region, he outlined the problem which this gave rise to as follows:

> "In the Province of Alberta alone, there are more than 600 known 'Uncontrolled Aerodromes', of which 207 are listed in the VFR Supplement. One circle of 20 nautical miles radius plotted on the 1976 Alberta Aviation Council 'Air Facilities Map' encompassed 39 of them.
>
> It would be unrealistic, to say the least, to consider designating Mandatory Frequencies at all uncontrolled aerodromes in Canada. It follows that the majority will never have a designated MF. (Section 8 of this paper - 'Lack of Selection Criteria. . . .' - discusses this aspect).
>
> Pilots are asking - 'What should a VFR pilot do at aerodromes where no MF is published?' There is no guidance on this in 0/4/79.
>
> Verbal complaints have been made to the Regional Aviation Safety Officer about 'close calls' and 'near-misses', in the vicinity of aerodromes with no MF and no ground station. (Written details have been requested). The complainants seemed to feel the other pilot was somehow at fault because no radio contact could be established after 'trying various frequencies'. They ask - 'What frequency should we be on at these places?' In the absence of specific guidance, the answer is a matter of personal opinion.
>
> It seems clear that some sort of consistent recommended practice is required. However, the 'solution' must not make the situation worse. For example, Transport Canada might recommend, or require that pilots broadcast arrival/departure reports on a common frequency on all 'non-MF' uncontrolled aerodromes - but, given the vast numbers of such aerodromes, this might well cause self-defeating frequency congestion."
> (Emphasis added.)

The situation is not peculiar to the Western Region, nor is there a ready solution of the problem. This is evident from the following passage from the evidence of Mr. Black:

> "MR. COMMISSIONER: Pilots are asking what should a VFR pilot do with an aerodrome where MF is published. What is your answer?
>
> THE WITNESS: My answer would be to fly the full traffic pattern, establish whether there is any communication facility there. I would

> broadcast, if I were not satisfied that I was getting adequate traffic information under the unicom and hope that other people would do the same. There is even a problem with that because you can have, in southwestern Ontario, any number of small airports that may have unicom and may have nothing and if we advocate that they broadcast all on a common frequency we end up as you mentioned yesterday, jamming the frequency. And then nobody gets anything."

It may be that there is no easy or ideal solution to what a pilot should do at an aerodrome where no MF is published. Nevertheless, to avoid the present uncertainty, Transport Canada must decide what procedure is to be followed and the adopted procedure should become part of the mandatory frequency regulations.

NATURE OF PILOT'S REPORT

In the brief prepared by Mr. McDonell on behalf of the Western Region, objection was also taken to an aspect of the guidelines which permitted a pilot to broadcast his reports after an initial communication with a ground station. Mr. McDonell recommended that where an FSS, RCO or CARS is in operation the pilot should use the broadcast format only when no reply is received by him. Mr. Black agreed with this suggestion and undertook to amend the guidelines accordingly. This appears to have already been done in respect of ANO V, No. 11 which permits a broadcast only when no ground station exists, or when a ground station fails to acknowledge a radio transmission directed to it from an aircraft. The ANO appears to deal with the matter satisfactorily for IFR reporting and should be extended to all other reports required under the MF plan.

PART VII

THE PROVISION OF OTHER AIR NAVIGATIONAL FACILITIES AND SERVICES

In addition to the provision of air traffic control services, including the commissioning and installation of the associated radar facilities, the air navigational facilities and services for which Transport Canada is responsible were set out in a brief submitted by the Air Administration as follows:

"(a) Enroute Facilities

(1) Non-Directional Beacon (NDB)

(2) Very High Frequency Omni-Directional Beacon (VOR)

(3) Distance Measuring Equipment (DME)

(b) Enroute Services

(1) Flight Service Station (FSS) - Communications, Flight Planning, Weather and Advisory Service

(2) Obstruction Markings

(c) Terminal Visual Aids

(1) Approach Lighting

(2) Obstruction Lighting

(3) Aerodrome Beacons

(4) Visual Approach Slope Indicator System (VASIS)

(5) Runway Edge Lighting

(6) Runway Threshold/End Lights (RIL)

(7) Displaced Threshold Lights

(8) Runway Centreline Lighting (for Category II)

(9) Runway Touchdown Zone Lights (for Category II)

(10) Wind Direction Indicator Lighting

(11) Taxiway Lighting (Edge and Centreline)

(12) High Speed Runway Exit Lights

(13) Marking and Markers

(14) Obstruction Markings

(d) Terminal Non-Visual Aids

(1) Non-Directional Beacon (NDB)

(2) Instrument Landing System (ILS)

(3) Runway Visual Range (RVR)

(4) Distance Measuring Equipment (DME)

(5) Microwave Landing System (MLS)

(e) Terminal Services

(1) Traffic Control Services - Traffic Controlled under both IFR and VFR Conditions

(2) Flight Service Stations (FSS) - Communications, Weather and Advisory Services

(3) VOR Test Facility (VOT)

(4) Precision Approach Radar (PAR)

(5) Very High Frequency Direction Finding Equipment (VHF/DF)

(f) Weather Services"

CATA PLANNING AND PROGRAMMING FOR AIR NAVIGATIONAL FACILITIES AND SERVICES

In its brief to the Commission, CATA provided the general outline of its planning and programming for air navigational facilities and services:

"(a) Current Requirements

Note: For the purpose of this paper, a current requirement is defined as one that should be provided within the next five years.

The initial identification of a need for any particular air navigation facility or service is carried out in the Region. This is accomplished by discussions with the users involving all segments of civil aviation, by staff or inspection visits to each airport, or aviation company, by flying the routes and airways involved and by using the facilities and services available.

An exception to the above is the identification of a requirement by ICAO to meet a special need of International scheduled air operations. This need would be stated in the NAT/NAM/PAC Air Navigation Plan but, notwithstanding, Canada would have the right to decline the provision of any facility or service requested if considered too expensive to provide and maintain or if limited operational value to other types of domestic traffic. Facilities or services that have been provided specifically to meet International needs include some high powered NDBs on the Atlantic Coast, a VOR at St. Anthony, Nfld., and the Air Traffic Services at Gander. In practically all other cases, the facilities and services identified for International traffic are also required for domestic movements.

It may be noted that the criteria on which the provision of a facility or service can be supported, cater essentially to the scheduled oprations. Of course, once provided, all other segments of civil aviation may use these facilities/services. Resources are simply not available to provide sophisticated electronic equipments such as the ILS or weather and communications services at every location where there would be limited usage. Therefore, it is essential to weigh each stated requirement very carefully from a cost-benefit point of view and to establish relative priorities of each project. The only exception, of course, is the urgent provision of a facility or service to meet a safety-related requirement.

The foregoing explains in broad terms the responsibilities for the identification of an operational requirement and the application of policies, standards and criteria to confirm that it is the responsibility of CATA to provide for this requirement and the need to establish relative priorities since resources are not available to meet all known demands. Once this stage has been completed, actions are then required to set the machinery in motion for the provision of any facility or service. A document CATA TP 333, 'Program Planning Procedures Manual', outlines the procedures and the documentation required for this purpose. (Note: This document is very detailed and is amended frequently to reflect new procedures including financial responsibilities and, therefore, is not included as part of this 'Brief').

(b) Future Requirements

Note: For the purpose of this paper, a future requirement is defined as one that is expected to arise sometime beyond five years.

Anticipated future requirements for air navigation facilities and services are identified during the process of developing National Airspace Plans, Area Master Plans and Airport Master Plans. These Plans include the best available estimates of civil aviation growth in any particular area with the resultant increase in demand for additional facilities and services. These Plans provide guidance material for the future procurement of new or replacement equipments and the increasing resources required for operation, maintenance and inspection functions.

(c) Special Requirements

(1) Arctic Program

The uniform application of policies, standards and criteria for the provision of air navigation facilities and services in all areas of Canada, including the Arctic, resulted in the Arctic Regions not receiving many of these benefits. The demand in the Arctic is considerably less than in the southern parts of the country, based on volume of movements, and resources are not sufficient to meet even the southern requirements.

This deficiency prompted the development of the Arctic Air Facilities Policy which gives prominent attention to the Government's objectives of increased sensitivity in providing services and in meeting the needs of individuals, the provision of a higher standard of living, quality of life and equality of opportunity for Northern residents and the encouragement of a viable economic development within the Territories. The Transport Policy developed the concept of Arctic 'A', 'B' and 'C' Airports, based primarily on population, and which included runway lengths, navigation aids and services. A Cabinet Submission in this regard was approved in 1974 which established, as well, the total dollar amounts authorized for Arctic 'A' Airports and for Arctic 'B' and 'C' Airports. The objective of the program was to provide the essential components of an air system to permit a regular and reliable air service.

The program was delayed in getting started and as it progressed, further delays were experienced in positioning the construction equipment at certain sites and the costs far exceeded the initial estimates. However, additional financial authorities have been obtained and the program is continuing.

A number of situations have arisen which have prompted a need for a Policy Review. There have been basic changes in air services and government administrations; there have been problems with the interpretation of what are 'minimum standards';

> there are changes relating primarily to the emerging role of the Territorial Governments, especially with regard to the operation and maintenance of airports, etc. All of these changing conditions will be considered during the forthcoming review."

(Emphasis added.)

NATIONAL AIRSPACE PLAN (NASP)

As appears from the foregoing, the provision of the facilities and services relating to navigational aids is theoretically carried out under plans emanating from headquarters. The current plan is entitled the "National Airspace Plan", the terms of reference for which were approved by the Air Administration in May of 1979. The CATA Manual of Planning Procedures, Chapter 7, describes the objectives of the National Airspace Plan (NASP), indicates its scope and outlines its relationship with other plans relating to the need for and provision of airspace facilities. Chapter 7 of the CATA Manual of Planning Procedures provides in part that the National Airspace Plan will encompass:

> "a) Those facilities and services which are provided via the Air Navigation Services Activity of the Air Transportation Program and those which are provided by Civil Aeronautics in support of the Arctic Air Program.
>
> b) Civil Aeronautics planning contribution to those elements of the Airports Activity for which input from Civil Aeronautics is required.
>
> c) Research and development projects associated with the provision of airspace facilities and services."

NASP was preceded by a plan entitled the "Canadian Airspace Capability Plan" which represented the first published plan for long-range development of Canadian airspace. Its recommendations dealt with the requirements of Canadian airspace between 1976 and 1986. Programs such as JETS and RAMP were not an implementation of the Canadian Airspace Capability Plan, but were ad hoc programs designed to meet the problems presented by Canada's aging radar system. The responsibility for the National Airspace Plan is that of Mr. Derek G. Perry, who is the Superintendent of the section entitled "National Airspace Planning". That section is a part of the division entitled "Aeronautical Development Planning" which in turn is part of the Aeronautical Planning Programs and Policies Branch, which in turn is part of the Civil Aeronautics Directorate. Mr. Perry has no staff. His program is to be carried out in five phases as follows:

"Phase I   Statement of Existing Airspace System.

Phase II   Identification of Potential Airspace Development.

Phase III   Identification of Constraints and Development Options.

Phase IV   Determination of Future Airspace Requirements.

Phase V   Publication of the National Airspace Plan."

At the time he gave evidence in September of 1980, Mr. Perry had completed Phase I. There is no timetable as to when he is to complete his task, but it is apparent that under present conditions it may be three to four years before he does so. This will be towards the end of the period covered by the Canadian Airspace Capability Plan which was developed between 1973 and 1976. That plan has been overtaken by events and is no longer current. This accounts in part for the fact that the radar installations at major Canadian airports are out of date, as has been previously noted.

In any event, and with no disrespect to Mr. Perry, it would appear that in view of the lack of support given to him, not much importance is placed on planning future needs for the Way component of the system. Furthermore, his section appears to be somewhat isolated from the two other branches which are intimately involved, namely, Telecom and ATC.

AREA MASTER PLANS

Area Master Plans are prepared within the regions but must, or should, conform to the National Airspace Plan. The contents and evolution of one such plan, namely, the Northern Ontario Area Master Plan, were examined in some detail by the Commission. Table 2.2 of this Area Plan lists the facilities to be installed under CATA's five-year plan in certain northern communities in Ontario. It must first be noted that this Area Plan could not conform to the National Airspace Plan as there is no National Airspace Plan at the present time over and above a statement of existing facilities. There is no evidence that Mr. Perry had any involvement in the preparation of this Plan which was developed as a reaction to the Northern Ontario Aviation Safety Study Report. In its analysis of that report CATA lists the Northern Ontario Area Master Plan as one of the actions taken to improve navigational aids in the north.

During the course of the Commission's hearings in Thunder Bay, Sandy Lake and Big Trout Lake, the many witnesses from the Bands that inhabit the northern regions of this province complained, with some considerable justification, about the absence of navigational aids. They were asked whether they were aware of the Northern Ontario Area Master Plan. Apparently there had been no consultation with the Treaty #9 Indians, nor, indeed, with many others who had a direct interest. In his evidence, Mr. Donald M. Wallace, Director of Air and Marine Service of the Ontario Northland Transportation Commission and Director of the program called NorOntair, testified that there had been no public review of the Plan and that most air carriers in the regions were unaware of its contents. In fact the only communication with Mr. Wallace's organization was a questionnaire received from the Air Administration soliciting information about aircraft movements and other matters. Sometime later, the report containing the plan arrived on his desk without explanation. This appears to be contrary to CATA's policy for public consultation which provides in part as follows:

> ". . . Philosophies:
>
> In the normal course of events, governments should give those directly affected by its decisions an adequate opportunity to state their needs and wishes.
>
> . . .
>
> Doing so encourages people to take an interest in the decisions that affect them and can improve the workability and acceptability of the decisions once made. CATA strongly endorses this concept and is committed to encouraging and facilitating public consultation in the development of and implementation of policy decisions and recommendtions wherever possible.
>
> . . .
>
> In implementing the above commitment, CATA will observe the following principles:
>
> On policy issues, public consultation must remain advisory in nature, because the final authority to approve or reject all CATA policy decision or recommendations rests with the Minister, the Cabinet and/or Parliament.
>
> On planning issues, the character of public consultation will be determined at the time the public consultation program is articulated."
> (Emphasis added.)

The major problem with relation to navigational aids in the northern areas is the absence thereof. No one would deny that given unlimited finances, additional navigational aids would be conducive to safety and would save lives. CATA's dilemma is to use the available resources in the most effective way in order to make the system as safe as it can be under the circumstances. From the evidence, I cannot conclude that this has been done. As is pointed out above, there has been a lack of input from users and other members of the public. For this reason, perhaps understandably, the Plan was subjected to some effective criticism.

CRITIQUE OF THE NORTHERN ONTARIO AREA MASTER PLAN

A carefully prepared analysis of the Northern Ontario Area Master Plan presented to the Commission was submitted by Mr. Donald M. Wallace on behalf of the Ontario Northland Transportation Commission, previously referred to. It was, in my opinion, a most helpful and constructive brief.

I set out hereunder some of its most significant provisions:

> "BACKGROUND
>
> This submission is made from the vantage point of commuter air carrier operations in Northern Ontario. The subject of aviation safety in Northern Ontario has been a matter of great concern for several years. After much public outcry Transport Canada launched a planning study which resulted in the document titled, 'Northern Ontario Aviation Master Plan'. This document recognizes past neglect and sets out a program to remedy current oversights. The program proposes the installation of a combination of air navigation aids, meteorological requirements and radio reporting facilities. Although no formal provision in the planning process was made to review the content of the plan with the intended users, a copy has come into the possession of the writer and we have had the opportunity to view the content of same. In our view the general program is commendable, but there are certain features which we believe require reconsideration. In particular we have difficulty with the provision of precision nav aids as outlined in the plan. Analysis of fourteen candidate airports for precision nav aids was carried out. Much to our disappointment, but not surprisingly, only three were deemed to meet Transport Canada standards. We have taken the opportunity to research this result and this effort has led to the aforementioned conclusion that Transport Canada underestimated the public benefits to be derived from precision landing aids.

ESTABLISHMENT CRITERIA

. . .

Firstly, one must have empathy for the environment of instrument flight operations. Without such it is extremely difficult to understand the total benefits offered by the two dimensional positive precision navigation aid as opposed to the less positive, less secure cloud breaking navigational aid. In our view it is much more than simply a question of a difference in approved landing limits and involves a whole range of psychometric issues and human factors.

The second subject area is the nature of the technology. Here one must recognize that the pace of progress in avionics is truly astounding and planners must guard against the tendency to 'fight the last war' or fail to keep up with current circumstances. A good case in point in this regard is the apparent preoccupation by Transport Canada planners with enroute navigation aids at the expense of landing aids. From the Northern Ontario Plan one gets the impression that Transport Canada considers enroute navigation to be a greater problem than approach navigation when in fact technological advances have rendered enroute navigation for even the most modest of aircraft to be far less of a concern than the problem of carrying out a successful approach at one's destination.

The third area of necessary knowledge is the matter of statistical inference. Here it is necessary to accept that public investment decisions may be made on the basis of the probability of avoiding risks to the public as well as for reasons of cost effectiveness. In this regard it should be emphasized that investments in landing aids are a form of insurance against risks and as such seem to conform with the general public's sentiment which places a responsible level of concern for safety above all other considerations. On the other hand if one reviews Transport Canada's designated mandate 'to provide facilities and to foster the optimum development of the mode of transport consistently . . . on a cost recovery basis to a maximum practical extent' one detects a conflict between the notion of the public sentiment of safety first and the current policy of cost recovery. It could be that this conflict is the heart of the issue of the establishment of instrument landing systems.

In an effort to gain perspective on the basis of M.O.T.'s present establishment criteria and the methodology pertaining thereto an analysis of the U.S. Federal Aviation Administration's methodology was undertaken. A look at F.A.A.'s methods seems to be particularly appropriate at this point observing that they have recently undertaken a major expansion in the implementation program for precision landing aids. The expansion of the American ILS network seems to be the product of a revision in the F.A.A.'s establishment criteria which is outlined in the document ASP-75-1. This document has had the effect of substantially lowering ILS establishment levels for air carrier served airports and this liberalization of establishment criteria initially led F.A.A. to authorize an additional thirty-five Category I ILS and to upgrade an

additional twenty-eight Category I ILS to Category II. Installation of these new systems is now under way and in the meantime F.A.A. have announced a further expansion awarding a massive contract for two hundred and five Category I ILS's for use at civil airports throughout the United States. At the same time the United States Air Force are undertaking a similar expansion at their locations. With a major program presently under way and over three hundred additional ILS's on order the U.S. authorities obviously feel it is imperative that precision landing aids come into greater use. Transport Canada, on the other hand, as previously noted with respect to the plan for Northern Ontario, seem to be under no such imperative.

In addition to the revised criteria, recent U.S. Congressional hearings have produced some significant discussion concerning the need for a greater number of precision nav aids. For example, in 1977 the chairman of the U.S. National Transportation Safety Board stated, 'I don't think any air carrier operation should be conducted on a runway that doesn't have a precision approach.'

. . .

In short, recent events in the United States seem to confirm that, after years of neglect, the need for more precision nav aids has been realized.

In reviewing the F.A.A. methodology, we determine that two major benefits are identified as flowing from precision landing aids. Firstly, is a reduction in flight disruptions or savings which accrue as a result of averted flight disruptions. To quantify flight disruptions the F.A.A. determines the benefits to be derived from an equation which includes the following:

- The average number of passengers
- The average delay time
- Value of passenger time
- The type of operation including air carrier, air taxi and general aviation
- The number of instrument approaches per annum
- Increased percentage of instrument runway usage due to lowered landing limits and,
- The percent of aircraft that have the necessary onboard equipment.

All of this data can be combined by a prescribed method to produce an overall savings due to averted flight disruptions.

In addition the F.A.A. method quantifies safety benefits. These benefits are defined on the basis of a report which was carried out under the auspices of the F.A.A. by the Mitre Corporation. This document, known as the Simpson

Report, analyzed some 18,602 landing accidents which occurred in an eight-year period from 1964 to 1972 and concluded that a great many fatal accidents may have been prevented by the existence of a precision instrument approach. The type of accidents considered included: (a) accidents which occurred while on final approach; (b) accidents which occurred after executing a missed approach and (c) accidents which occurred while on a circling approach as part of a cloud breaking procedure.

On the basis of this analysis the author identified a total of 152 fatal accidents which may have been prevented by the availability of precision landing aids. Of these, 83 involved non-precision IFR approaches and the remainder involved visual approaches. Of the 152, 25 involved air taxi operations, 14 involved corporate operations, 10 involved air carriers, and a total of 103 involved general aviation operations. The F.A.A. have developed a method by which safety related benefits can be determined in dollar quantities. . . .

Without doubt Simpson's method has limitations, but it must be emphasized that it is based on empirical evidence and for that reason provides a valid tool to assess safety related benefits. On the other hand, M.O.T.'s method apparently fails to give credit to precision nav aid for the prevention of accidents per se. M.O.T. takes into account only the average number of passengers per averted disruption against potential increase in service due to the augmentation in the instrument landing system. There are some striking omissions in the M.O.T. system vis a vis the F.A.A. system. For example, only commercial aircraft movements are considered, thereby ignoring private, corporate and military movements. This, in effect, rules out approximately 45 per cent of all instrument approaches. Likewise only unit toll passengers are tabulated, thereby ignoring passengers carried on charter flights which constitute about 15 per cent of all passengers carried by Canadian carriers. By these two discounts the number of eligible approaches is cut in half. This leaves one with the impression that M.O.T. believes that only commercial unit toll operations deserve the benefits of precision nav aids, which opens up a serious question of equity. It is quite clear that other than commercial unit toll operators contribute to the cost of precision nav aids through user charges and yet they are not entitled to the benefits of the system.

In addition the M.O.T. system makes no explicit reference to safety derived benefits.

. . . A direct comparison of the two approaches is no doubt debatable in fine detail, nonetheless the difference is of such magnitude that it begs the question, which of the two methods provides the most valid guide to decision makers. In our view, observing that their methods are comprehensive and are based on statistically valid research, the F.A.A. system is the soundest. Transport Canada's system appears to be largely subjective, appears not to be based on research, is unjustifiably restrictive in application of benefits and, most important, fails to make allowance for safety benefits.

Why Transport Canada should have such an approach is difficult to say. It could be that safety benefits have difficulty qualifying in a decision making environment concerned solely with cost recovery. This is a very stark statement, indeed, but it seems that nav aids and other devices which save lives are given no special priority whatever under the Transport Canada system. I hope this is not the case, and it would be most difficult to prove beyond reasonable doubt; however, it is clear that there is a very great difference between policies and practices applied in Canada and the United States with respect to the establishment of precision nav aids. At the present time, U.S. authorities are undertaking a massive program to upgrade precision navigation facilities which reflects a recognition of the importance of precision nav aids. Transport Canada have undertaken no such upgrading and apparently do not share F.A.A.'s opinion with regard to precision nav aids. It is submitted that this disparity in policies and practices is not surprising observing differences in establishment criteria and methodology.

It is our view that Transport Canada's present policies and methods with respect to the establishment of precision nav aids are lacking in an empirical basis, are unjustifiably restrictive in application and are deficient in method regarding the assessment of derived safety benefits. It is our conclusion that these weaknesses contribute to the current failure of Transport Canada to establish the requisite number of precision landing aids in Canada."
(Emphasis added.)

Mr. Wallace also pointed out that as a result of the criteria established by the Air Administration that landing aids are ruled out with respect to many centres by the use of a method which fails to make any reference to the empirical basis on which it is based. These centres are Pickle Lake, Wawa, Kapuskasing, Red Lake, Fort Frances, Kirkland Lake, Kenora, Atikokan, Elliot Lake, Chapleau and Earlton. As a further example of what he regarded as defective or backward planning, Mr. Wallace cites the example of Elliot Lake where the airport has become very busy. An aircraft approaching the airport passes through an airway which is in controlled airspace. Once the aircraft passes out of controlled airspace, separation is maintained by the pilots themselves who depend upon the listening watch and eyesight. Mr. Wallace considers that the logical thing would have been to extend the controlled airspace to permit the approach procedure to be completed. Instead the Air Administration proposes to move the airway so as to eliminate the controlled airspace. Mr. Wallace is very concerned about maintaining separation in the absence of this type of control. This would not involve a control tower at Elliot Lake, but the airspace could be controlled from Sault Ste. Marie, North Bay or, perhaps, Toronto International airport.

GRAND COUNCIL TREATY #9

Mr. Lesley Louttit presented a brief on behalf of Grand Council Treaty #9. Grand Council Treaty #9, an Indian Association of Treaty #9 Chiefs, represents the Ojibway-Cree Indians in an area of Northern Ontario that stretches from the Quebec border to Manitoba and along a line roughly from the 50th parallel north to Hudson Bay and James Bay. Included in the brief was the following submission with respect to navigational aids:

"NAVIGATIONAL AIDS:

Non-Directional Beacons (NDB's) have been installed by the Ministry of Transportation and Communications at the following communities:

Fort Albany	Fort Severn	Sandy Lake
Pikangikum	Winisk	Lansdowne House
Round Lake	Attawapiskat	Fort Hope

However, these NDB's have a lower power output for VFR flight navigation and may not be used for planning IFR flights or instrument let-downs unless authorized by Transport Canada and Ministry of Transportation and Communications. The Ministry does not guarantee absolute reliability of an NDB installation although it includes dual transmitters with automatic change-over in case of malfunctions. The power source in most communities where NDB's have been installed permits an 80% reliability.

a) It is therefore recommended that Transport Canada authorize the installation and maintenance of reliable high-power NDB's in the followng Indian communities/reserves:

Kashechewan	Wunnumin Lake	Deer Lake
Ogoki	Kingfisher Lake	Bearskin Lake
Webequie	Kasabonika Lake	Sachigo Lake

Transport Canada will also replace all NDB's at the locations where they have been previously installed by Ministry of Transportation and Communications with high-power, quality and reliable NDB's.

b) It is further recommended that Transport Canada install and maintain VHF Omni-Directional Range Stations (VOR) and Distance Measuring Equipment (DME) at the following locations to permit improved VFR and IFR navigation north of the 48th parallel:

Pickle Lake	Sandy Lake
Big Trout Lake	Attawapiskat
Winisk	

At the present time VOR/DME facilities are only available at Red Lake and Moosonee, Ontario for flights north of the 50th parallel. Proper enroute navigational facilities must be a Transport Canada priority at these locations.

c) Other landing approach equipment such as High Intensity Approach Lights (HIAL), Runway Identification Approach Lights (RIAL), Visual Approach Slope Indicators (VASIS), and Standard Runway Lights should be installed at locations identified in Transport Canada's 'Northern Ontario Aviation Master Plan' of November 1979 which the people of northern Ontario were not involved in during the planning process. If such a plan is to be implemented, the Treaty No. 9 organization and member Band Councils must insist on full and direct involvement in the planning process."

ONTARIO MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

Mr. Russell P. Killaire, Senior Aviation Planner for the Ontario Ministry of Transportation and Communications, described the Northern Ontario situation as follows:

> "Well, traditionally Northern Ontario has been, has taken a back seat if you like, in respect of navigational aids to the southern areas of the country. Because the criteria used in determining, whether there was justification or not was based on traffic volume, and on that criteria the southern areas always reign supreme."
> (Emphasis added.)

He also pointed out that there has been a dramatic expansion in scheduled passenger service in Northern Ontario since 1968. In that year only eight communities were served by scheduled passenger service. In 1980 there were 20 such communities. Nevertheless, during this period only a very modest improvement has taken place in the navigation system.

Mr. Killaire's concern that volume of traffic is the single criterion for the determination of the provision of navigational aids was confirmed by Mr. Pierre E. Arpin, Director General, Civil Aviation, in the following exchange during his testimony:

"MR. COMMISSIONER: What I am concerned about a bit, and I have no views on it at the moment, but if it is based on traffic only - is that the answer?

THE WITNESS: That is a criteria. If you look at how do we justify to the Treasury Boards expenditure of public funds, public funds have to be expended to serve the most people possible.

MR. COMMISSIONER: But if you get a higher incidence of fatalities with less traffic, doesn't that point out the need for more navigational aids? If you test it that way, by the fatal accident rate and the fatality rate, even though the traffic is less, it might throw up a reason for improving navigational aids, apart from traffic.

THE WITNESS: It is a good point except that this is not an argument that is considered worthy of, say, adding additional points to a request because it is in an isolated area for the reasons you mentioned. It is not part of our criteria. Right now it is based strictly on the volume of traffic." (Emphasis added.)

AIR TRANSPORT ASSOCIATION OF CANADA (ATAC)

In its brief on the subject matter of navigational aids as it relates to northern and remote air facilities, the Air Transport Association of Canada made the following observations:

"V. NORTHERN AND REMOTE AREA FACILITIES

During Phase III (Enforcement) and Phase IV (Nav Aids), the Commission heard a great deal of evidence relating to the provision of air services in northern areas of Canada. In many instances, the standard of safety provided has been found lacking, and without exception the lack of enroute nav aid facilities, together with inadequacies in airport and weather information services have been cited as the main reason for difficulties encountered by most air carriers providing scheduled unit toll, charter, and specialty service to this vast area of Canada.

It is ATAC's position that resolution of difficulties associated with provision of service to remote or sparsely settled areas of Canada cannot be accomplished solely by changes in regulation, and enforcement of same.

It is essential that the Department of Transport not only update its proposed plan for air navigation aids and other airport facilities in the northern areas of Canada in consulation with the relevant air carriers, but that, in addition thereto, a timetable for implementation be established upon which the air carriers can rely.

The major air carriers serving the northern areas of Canada have demonstrated that they are ready, willing and able to undertake the necessary investment to upgrade their aircraft and facilities provided the Department of Transport establishes the necessary level of navigational aids and facilities. Indeed, many such carriers have commenced the updating of equipment and facilities only to find that the projected navigational aids and other airport facilities have not been forthcoming.

Today the level of navigational aids and airport facilities throughout the northern areas of Canada vary from area to area and at times from point to point, resulting, in many instances, in inadequate levels of safety regardless of the type of aircraft operated by the air carrier."
(Emphasis added.)

OPERATIONAL SYSTEM REVIEW (OSR) OF THE AIR NAVIGATION SERVICES ACTIVITY IN NORTHERN ONTARIO

An Operational System Review of the Air Navigation Services Activity in Northern Ontario was conducted during the period January 12 to January 20, 1981 by the Aeronautical Activity Management and Review Branch of the Air Administration. A copy of their report was forwarded to me by the Administrator, and I set out hereunder portions of it:

"GENERAL DISCUSSION

Aircraft operators in Northern Ontario are almost unanimous in describing the air navigation services in the area as inadequate. While the southern part of the area has been provided with a reasonable level of navigation aids, approach aids in many places are said to be insufficient. The northern part of the region, however, is nearly devoid of navigation and approach aids and was described as a 'black hole'. Where services are provided, operators praised the services and cooperative attitude of Transport Canada personnel, but generally felt that Northern Ontario had been neglected for too long in the provision of facilities and services for air navigation. The prime concerns expressed by operators were about the lack of approach aids, weather services, communications and navigational aids, especially in the more northern areas.

While traffic statistics do not reveal any spectacular growth, the expectations of the general public have risen commensurate with those of the population in other parts of Canada, and the demand for safe, regular air travel has increased accordingly. Rightly or wrongly, comparisons with other areas of equal population in other parts of the country lead to a feeling of neglect and suspected indifference to local needs. These views are strengthened by their remoteness from and infrequent contact with personnel from the Ontario and Central regional offices.

Operators expressed dissatisfaction with the consultative process in that their views were seldom solicited, and they suspect that when consultation took place, their recommendations were mostly ignored. The Ontario Ministry of Transportation and Communications expressed satisfaction with the dialogue between themselves and regional offices, but felt that the sectorization of Northern Ontario between Ontario and Central Regions is undesirable because the two regions have different priorities and perceptions of the needs of the Northern Ontario area. OMTC feel that the Northern Ontario Area Master Plan (NOAMP) is a good vehicle on which to base development of the air navigation services in the area, and that Ontario Region had done a good job of programming improvements into the 5-year program, although slippage in the program somewhat tempered their satisfaction. In their view, Central Region have not responded with the same expediency and too few system improvements have been included in their 5-year program

. . .

The NDB situation is an example of the general opinion of operators in the area that TC is not doing enough to explain its policies and programs. The explanation which they have received have not convinced them that TC policies place enough emphasis on the needs of local operators. In the same way, the introduction of JETS is perceived as a retrograde step in providing a satisfactory level of service in the area. They can foresee a reduced level of service under JETS and the loss of control information for weather and traffic avoidance. Operators in the Sault Ste. Marie and Kenora areas are understandably unhappy at having to give up services which they have enjoyed for many years, simply to facilitate the implementation of JETS.

In the opinion of the smaller operators, the remoteness of the area from regional offices imposes an economic penalty on their operations insofar as access to examinations, licensing and airworthiness services are concerned. The opening of field offices to provide such services is strongly desired, and the initiatives taken by Central and Ontario Regions in opening field offices in Thunder Bay and Sudbury respectively is seen as a positive step towards meeting this requirement, though some of the more remote locations would still be far enough removed to feel that they should be provided regular visits by appropriate inspectors.

The generally poor weather in Northern Ontario, coupled with the lack of communications and weather reporting stations, is of great concern to the operators and could have a potentially adverse effect on safety of flying operations in the area. Quality of forecasts, availability of weather information, and accessibility to aviation weather services were uniformly described as not meeting the level of service required. More comprehensive aviation weather services were requested in the areas north and west of Kapuskasing, as well as along the north shore of Lake Superior. The trend towards reducing hours of operation of FSSs, with the resultant lack of weather reporting during silent hours, is thought to be adversely affecting the quality of early morning forecasts essential to safe operations. The number of briefers and telephone lines in the larger centers was also described as insufficient to meet the demand for weather briefings.

At a number of locations in the area served by scheduled service, facilities are extremely austere. Of particular concern is Elliot Lake, which is also experiencing a surge of activity due to increased interest in uranium mining and exploration. Elliot Lake is outside controlled airspace and has no communications with the control/advisory system. Aircraft below 3000 feet cannot communicate with ATC or FSS facilities. A private NDB is the only navigation/approach aid available, with 13 agencies authorized its use for approaches. It is suspected that a number of unauthorized operators also use the approach procedures. Safety of operations at Elliot Lake was questioned by most operators, and an immediate need appears to exist for a public NDB, communications, and some form of third party intervention to provide an appropriate level of control/advisory service.

At Elliot Lake and other locations in the review area, the statistical aircraft movement data on which the provision of ANS facilities is normally based appears inadequate to meet the needs of remote areas. Yet, there is high expectation for air services at remote locations because of the lack of other suitable means of transportation. Air services are, in fact, being provided in very difficult circumstances. This situation could have an adverse effect on safety of operations, unless better ANS facilities can be provided. It would appear that a policy needs to be developed for remote areas south of 60°N, similar to the Arctic air facilities policy but perhaps with provincial participation, in order to provide for the special needs of these areas in achieving the required level of navigation/approach aids, communications, weather and control advisory services.

. . .

In summary, it can be said that the ANS system in Northern Ontario is adequate to serve the needs of air traffic in the area if measured on the same basis as other populated areas of the country. However, there is a strong feeling that the level of service is not sufficient to guarantee an adequate level of safety for flying operations being undertaken in the area, particularly in the more remote parts of the area.
(Emphasis added.)

The report made special note of individual items of which the following are particularly germane:

"**Subject: Remote Airports Air Facilities Policy**

Observation:

The operators serving the northern and northwest parts of Ontario expressed dissatisfaction with the level of aviation weather services, public communications facilities, and navigation/approach aids. Although the NOAMP addresses many of these deficiencies, implementation action may be slow because of other higher priorities and lack of data to support

requirements. A similar situation existed with respect to provision of facilities in the Arctic until the Arctic Air Facilities Policy provided for specific facilities and special funding.

Recommendation:

11-2A Action be taken to develop an air facilities policy for remote areas south of 60°N. Such a policy could be modelled along the lines of the Arctic Air Facilities Policy but with provincial participation.

Regional Reaction:

11-2A Ontario - Agree

Central - Agree

Subject: Radar Control Service - Remote Locations (Sault Ste. Marie, Kenora)

Observation:

Sault Ste. Marie and Kenora radar sources are being remoted to the ACCs at Toronto and Winnipeg respectively, in conjunction with the introduction of JETS. Because only secondary radar information is remoted, primary information from these and other similarly remoted sites will not be available to controllers. Questions arise regarding the provision of radar control service using secondary radar information in low level controlled airspace where radar vectoring and separation may be undertaken without the ability to 'see' non-transponder equipped aircraft. There is also concern from users over system ability to provide weather avoidance information under such circumstances.

Recommendation:

11-5A (i) Direction and procedures be reviewed and clarified for use of secondary surveillance radar for control of traffic in airspace where non-transponder equipped aircraft may exist, and appropriate information in this regard be published in AIPs; and

(ii) That similar guidance and explanations be published with regard to radar weather warning capabilities.

Regional Reaction:

11-5A (i) Ontario - Agree
Central - Agree

(ii) Ontario - Agree. Use of AES WX radar information should be investigated.
Central - As above

Subject: Aircraft Advisory and Control - Elliot Lake

Observation:

All operators which serve Elliot Lake expressed concern over flight safety due to high traffic levels operating in an uncontrolled environment. This view was supported by Toronto ACC and Sault Ste. Marie Enroute Radar. Recent action to shift V316 away from Elliot Lake has only served to place all arrivals and departures in uncontrolled airspace and did nothing to improve service or safety.

There are 13 operators authorized to conduct IFR operations into Elliot Lake, plus others who have obtained letdown procedures and use them as well. Pilots not familiar with area and VFR operations add to the problem. The only advisory is UNICOM, but the local operators have little or no training and do not even possess a restricted radio telephone operators licence. OCA has plans to improve communications and establish a Transport Canada NDB to serve the airport. However, there appears to be the possibility of delays due to land acquisition problems, etc.

In summary, there is a potentially hazardous situation with air traffic at Elliot Lake, and the intervention of a third party to provide advisory and/or control is required as soon as possible.

Recommendation:

11-11A Region take immediate steps to provide Elliot Lake with:

(a) effective communications;

(b) a public NDB; and

(c) an adequate level of advisory/IFR control services.

Regional Reaction:

11-11A Ontario - Agree. Aware of problem and everything possible is being done to provide adequate level of service."
(Emphasis added.)

COMMENT

The complaints made with respect to the lack of navigational facilities and services were not unique to Northern Ontario. Similar evidence was submitted with respect to the lack of such facilities and services in other remote areas of Canada.

The fundamental error, in my opinion, underlying the present plans for the installation of such facilities is its dependence on traffic as the sole criterion. The broad policy of the Air Administration, set forth above, concedes that the criterion on which the provision of a facility or a service can be supported caters essentially to scheduled operations. Although the policy statement acknowledges, as an exception, the urgent provision of a facility or a service to meet a safety related requirement, in practice this factor appears to have been ignored.

The Northern Ontario Area Master Plan is not an evolution of the National Airspace Plan or its predecessor, the Canadian Airspace Capability Plan, but was a response to the Northern Ontario Aviation Safety Study Report. It was prepared without adequate consultation and input from the air carriers which service the regions, from the Indian Bands and from other members of the public.

In the determination of the necessity for the commissioning of a control tower with its associated radar facilities, traffic should be the major criterion since the principal purpose of such facilities is the separation of traffic. However, in the case of navigational aids, traffic cannot and should not be the major criterion. Since the highest percentage of accidents occurs at the landing stage, greater emphasis must be given to approach aids. In determining the level of services required, the major consideration must relate to the problems peculiar to operations in remote areas.

I agree with Mr. Wallace in his assessment that the emphasis by Transport Canada planners on enroute navigational aids has been at the expense of landing aids.

It is apparent, I think, from what has been outlined above that the navigational aids in place in many of the remote areas of Canada are presently inadequate, and not sufficient to guarantee an adequate level of safety for flying operations being undertaken in those remote areas. There will be little, if any, improvement if traffic is to remain the sole criterion for determining the need for further facilities. This is the basis of the present plan. What is needed is a re-evaluation so that, in future, greater regard would be given to the special hazards encountered when flying into airports in the remote areas, and a greater emphasis would be given to safety related requirements. An analysis of those areas where accidents occur by reason of the absence of navigational aids should also be

undertaken, and the results taken into account. In the development of new area plans, there also should be full consultation with those who are primarily affected by the lack of such a plan.

Furthermore, consideration should be given to the method used by the Federal Aviation Administration of the United States in determining the need for instrument landing systems. The Federal Aviation Administration method quantifies safety benefits. If such method were adopted here, an investment in precision navigational aids would be warranted in many airports which do not meet present CATA criteria. While this does not justify the automatic adoption of Federal Aviation Administration criteria, it does point out the inadequacy of a formula which takes no account of safety benefits.

As has been noted, CATA recognized that a uniform application of policy standards and criteria for the provision of air navigational facilities and services in all areas in Canada deprived the Arctic Regions of many of these benefits. As a result, an Arctic air facility policy was initiated. The objectives of the Arctic air facility policy were to meet the needs of individuals, to provide a higher standard of living for them, to improve their quality of life, and to provide an equal opportunity for northern residents as well as to encourage a viable economic development for that area. Apparently, little has been done to implement the policy, and CATA recognizes a need for a policy review of the program.

In developing a program for the provision of air navigational facilities and services in other remote areas of Canada, I think the same objectives should be applicable and should be factored in the criteria for the future provision of air navigational facilities and services in all the remote areas of Canada.

In addition, one must always have regard, as Mr. Wallace noted, that there is a public sentiment which places a responsible level of concern for safety above all other considerations. I think he also properly crystallized the issue in the following passage from his brief, which I think is worthy of reproduction:

> ". . . On the other hand if one reviews Transport Canada's designated mandate 'to provide facilities and to foster the optimum development of the mode of transport consistently . . . on a cost recovery basis to a maximum practical

> extent' one detects a conflict between the notion of the public sentiment of safety first and the current policy of cost recovery."

It cannot be overlooked that those who are most dependent for their very existence on aircraft reside in the remote areas of Canada where flying is most hazardous. Their needs should be given a higher priority than has appeared to have been given to them in the past.

PART VIII

A GROUND PROXIMITY WARNING SYSTEM

In addition to the navigational aids already discussed, a short comment is necessary with respect to a Ground Proximity Warning System (GPWS) which is presently widely used and has received support from those concerned with aviation safety, but which is not yet mandatory in Canada.

The Ground Proximity Warning System is an airborne system designed to monitor automatically and continuously an aircraft's flight path and warn of imminent ground impact.

During the hearings in Edmonton, the Commission had the benefit of the expert testimony of engineers employed by Sundstrand Data Control, Inc., the manufacturer of the Ground Proximity Warning System used by airline carriers in the United States and by some Canadian airline carriers.

The history and utilization of this device are fully described in the CALPA brief, which I set out hereunder:

> "A Ground Proximity Warning System (GPWS) is an airborne system designed to monitor automatically and continuously an aircraft's flight path and warn of imminent ground impact. The system takes its input from the radio altimeter, the air data computer (for barometric altitude and Mach/air speed), the glideslope receiver, and flap and gear switches. Using various combinations of this information, the GPWS will alert the flight crew to any inadvertent excessive closure rate with or proximity to the ground that exceeds certain parameters, depending on the configuration of the aircraft, and any descent below an ILS glideslope.
>
> The concept behind the GPWS had its origins in the 1940s but inadequate technology at that time led to its deferment until the mid-1960s when the capability became available to expand the original idea toward its present form. Initial installations in aircraft were made outside North America in 1972, and in 1974 the FAA made a GPWS mandatory equipment on all aircraft of U.S. air carriers operating under FAR Parts 121 and 123, as of September 1, 1976. Several other countries have also made the GPWS a mandatory item.
>
> Since the widespread installation of GPWS, there has been a dramatic decrease in the historical yearly accident rate involving inadvertent

> controlled flight into terrain. In addition the GPWS has detected many airport instrument approaches that were marginal in terrain clearance in the initial approach areas (it has even detected a previously uncharted mountain peak just 400 feet below a published minimum vectoring altitude), thus allowing corrective action to be taken.
>
> Many of the early systems experienced problems in operational use, the deficiencies being a result of too rapid and inadequate research and development caused by the scramble to meet the new FAA regulations (over 2000 aircraft were fitted with GPWS in a one-year period). The major problem was unwanted false or nuisance warnings and some U.S. carriers have experienced such warnings on one in every ten approaches.
>
> As a result of operational experience and considerable research and development, a second generation GPWS is now available. In addition to offering improvements in the protection against inadvertent proximity to terrain in various flight regimes, the new models virtually eliminate the shortcomings of earlier designs, particularly unwanted warnings."

In addition to having had the benefit of the expert testimony and the statistical information provided as to its utilization in the United States and several other countries, I was afforded, in company with Mr. Sopinka, the opportunity of observing the operation of this device firsthand. Sundstrand Data Control, Inc. provided a Queen Air 90 equipped with a GPWS for demonstration purposes. The utility of this device and its contribution to safety were demonstrated on the flight which was provided for Mr. Sopinka and myself.

As is noted in the CALPA brief, the Ground Proximity Warning System was made mandatory on all aircraft of United States air carriers operating under Parts 121 and 123 of the Federal Aviation Regulations as of September 1, 1976. Several other countries have also made the Ground Proximity Warning System a mandatory item.

The Air Administration has had for some time under consideration a mandatory requirement for a Ground Proximity Warning System. It hesitated to follow the American practice because of deficiencies which were noted in the initial design of the equipment. The equipment now in place has been updated, and I am satisfied that the deficiencies earlier noted have now been virtually eliminated.

The device is relatively inexpensive and, in my opinion, Transport Canada should now make a Ground Proximity Warning System mandatory for all Canadian civil aircraft engaged in the carrying of passengers for hire.

PART IX

TRAFFIC MIX

One of the most serious and difficult issues presented to the Commission was that of traffic mix at the large international airports across Canada and at many smaller airports as well.

At the large international airports across Canada, a variety of aircraft types may be landing and taking-off at any given moment. This "traffic mix" includes jet aircraft, turbo-propellor aircraft, piston engined aircraft, heavy transports and light training aircraft. Some aircraft fly at 250 knots, while others fly at 50 knots. Some aircraft are flying according to instrument flight rules while others fly according to visual flight rules.

At present, the principal restriction on traffic mix at Canadian international airports is contained in Air Navigation Order, Series V, No. 19, the VFR Flight Procedures at Designated Airports Order:

> "3. (1) No person shall conduct any dual or solo VFR flight for the purpose of training any person who is not the holder of a valid pilot licence or private pilot permit (tourist) at any airport listed in the schedule or within the positive control zone associated with such an airport.
>
> (2) Subsection (1) does not apply to the initial departure of a VFR training flight intended to proceed elsewhere or the return of a VFR training flight where the aircraft is based at an airport listed in the schedule.
>
> 4. Any person operating an aircraft that carries out a VFR arrival or departure or a simulated approach under VFR at an airport listed in the schedule shall comply with the requirements of any NOTAM issued pursuant to section 5.
>
> 5. The Regional Controller, Civil Aviation, may, where necessary for the safety of air traffic at an airport listed in the schedule, issue a Notice to Airmen (NOTAM)
>
> (a) restricting to certain periods of time VFR arrivals or departures or simulated approaches under VFR at that airport; or

(b) requiring aircraft carrying out VFR arrivals or departures or simulated approaches under VFR at that airport to be equipped with specified communication facilities or requiring the crew of such an aircraft to have specified qualifications.

SCHEDULE

Calgary International Airport
Edmonton International Airport
Montreal/Dorval International Airport
Montreal/Mirabel International Airport
Toronto International Airport
Vancouver International Airport
Winnipeg International Airport"

Hence, the prohibition is directed at pilot qualifications, and the Regional Controller, Civil Aviation, has the authority to further restrict VFR aircraft.

A number of witnesses expressed their concern that the traffic mix created serious safety hazards, although there was far from unanimity on that issue. From the point of view of the Canadian Air Traffic Controllers Association, the present situation was described as follows:

> "Traditionally, air traffic control has served the users on a first come, first served basis. However for several years there have been complaints on the part of air carriers that they are not receiving adequate service at Canadian airports. They feel that their needs are being seconded to those of the general aviation and other segments of the industry. Air traffic controllers are in the business of separating traffic and accommodating the flow of traffic into and out of airports regardless of its composition. It is for that reason that we will not take a position as to which operator, if any, should receive priority treatment. However, we must point out that if a dozen aircraft are desiring to take off from an airport at any given time, one of them has to be first and one has to be last. Likewise if a dozen want to land, one has to be first and one has to be last. In each case someone takes a delay. This is not appreciated by the carriers as they feel that they are the ones that should have priority at the major airports. As a result, controllers receive numerous complaints from operators as to who should be getting service first. <u>The Department of Transport has really not taken hold of this issue except to say to controllers that VFR traffic should be restricted on a flow control basis. In the Pacific Region this was done by means of an aviation notice. In addition, at Vancouver Tower, the Unit Chief has now taken his own initiative in the matter, and thrown the first come, first served principle by the boards. He has directed his controllers to give priority to heavier aircraft over lighter aircraft.</u>"
> (Emphasis added.)

The CATCA brief outlined various proposed alternative solutions of the traffic mix problem as follows:

> "We are not particular about who receives our service, or in what order. All we require is that people understand the order and follow it, realizing of course that someone will always be last. Several suggestions have been put forward on how to accomplish this. One is to restrict operations to airline traffic only at certain airports; another is to restrict the operations based on the speed of the aircraft, which makes our job somewhat more straightforward if all aircraft must be capable of a certain minimum speed. A third suggestion is to restrict traffic at certain airports to instrument traffic only; and a fourth is to restrict operations to specified types of aircraft during limited hours of the day. An additional solution to the problem of traffic mix is to create reliever airports similar to the solution put forward for Quebec City. . . .
>
> One point worthy of note from our point of view is that the aircraft type, although to a certain degree a factor influencing the outcome of operations, is not really the predominant factor in the ability of a controller to handle the flow of traffic. Rather the pilot's ability to receive, understand, and comply with control instructions and clearances is the crucial factor. The inexperienced pilot is a far greater workload on the controller than the experienced pilot. An experienced pilot flying a Cessna 172 or a similar type of aircraft can be accommodated as easily into most airports as can an experienced pilot flying jet-type aircraft."
> (Emphasis added.)

In his testimony Mr. William J. Robertson, President of CATCA, added the following observation:

> "I think the question of pilot qualification is more directly related to the safety question than the type of aircraft. I know from my personal experience as a controller at Toronto International Airport for 10 years that if the pilot knows what he is doing, whether he is flying a 150 or a 747, he is not a problem. You can put the mix together. It is when you have the inexperienced pilot that you have problems."
> (Emphasis added.)

Dr. R. Richard Shaw, Assistant Director General in the International Air Transport Association (IATA), an association of domestic and international scheduled airlines, advocated the following:

> "As a basic worldwide policy IATA has the objective of complete segregation of aircraft operating under instrument flight rules and those operating under visual flight rules through the provision of secondary airports for the use of

VFR traffic. This is a basic safety objective. While we recognize that in the real world, we cannot attain this overnight, it remains our long-term goal." (Emphasis added.)

Dr. Shaw cited figures for American high density traffic airports, such as John F. Kennedy Airport in New York and Chicago O'Hare Airport where IFR operations reach 70 movements and 115 movements per hour respectively. He noted the restriction on VFR aircraft contained in the American Federal Aviation Regulations:

> "FEDERAL AVIATION REGULATION PART 93
>
> (b) VFR. The operator of an aircraft may take off or land the aircraft under VFR at a designated high density traffic airport if he obtains a departure or arrival reservation, as appropriate, from ATC. The reservation is granted by ATC whenever the aircraft may be accommodated without significant additional delay to the operations allocated for the airport for which the reservation is requested and the ceiling reported at the airport is at least 1,000 feet and the ground visibility reported at the airport is at least 3 miles. (Added 93-13, April 27, 1969)."
> (Emphasis added.)

The Canadian Air Line Pilots Association in its brief made the following comment on this issue:

> "CALPA's main concern is the problem of VFR and IFR traffic mixing in high density airspace. Every effort must be made to separate IFR and VFR traffic in busy terminal airspace. Obvious safety considerations that cannot be ignored make such a policy mandatory. Transport Canada may be able to treat VFR and IFR traffic in such areas 'in a fair and equitable manner' by use of special procedures, special routings, separate runways for IFR and VFR or even dual airports (one part for VFR, another part for IFR). Innovative yet realistic planning and superior management and control may provide the answer."
> (Emphasis added.)

Not all witnesses agreed with the ban on VFR traffic. Mr. Russell J. Beach, of the Canadian Owners and Pilots Association, offered the following solution:

> ". . . I've landed at Dallas International in Washington, and I have been cleared to land on a taxiway, so it is common practice to land on taxiways at busy airports, if the main runway is tied up.

. . .

We think that there is a lot of merit in the idea of providing adequate alternate airports that can be used for general aviation when they don't require the services or don't need to go into an airport, like, for example, Toronto. You've got Buttonville or Toronto Island, but neither of them has -- Buttonville is too far out, really, for a downtown general aviation airport. Toronto Island, if it was given a chance, would be an ideal location but it requires landing facilities and a landing connection."

Specific complaints were received about the mix of traffic at Quebec City Airport, and various parties suggested solutions such as the construction of satellite airports and extra runways. The Air Administration replied to this criticism as follows:

"The Air Traffic Services Branch when carrying unit audits usually comments on any serious difficulties or unsafe conditions which may exist at certain airports as a result of the mix of non-compatible aircraft. In addition, during the Bilingual IFR Communications Simulation Studies, the Simulation Team investigated the mix of VFR/IFR traffic at several airports in Quebec, including Quebec City. The primary objective of this study was to determine if this mix could be realistically simulated. Nevertheless, although we concur that the mix at Quebec City is complex, there are several airports in Canada that face similar situations. In fact, this mix of non-compatible aircraft is a major air traffic control problem. At certain airports where substantially greater traffic is involved, the traffic mix problem is more complex (e.g. Vancouver).

There has never been an accident at Quebec City airport as a result of the mix of non-compatible aircraft."
(Emphasis added.)

The traffic mix problem is not limited to large international airports. The brief of the Red Lake Flying Club mentioned the mix of land and sea planes around the Red Lake Airport:

"There is a great number of movements in the Red Lake area; many more than most people realize. While the activity at the Red Lake Airport is documented by the M.O.T., there is two to three times (maybe more) additional off-airport seaplane movements that are unreported. The actual number cannot be estimated at this time, but there are in excess of forty commercial and business aircraft operating off the water; many on short trips with a continuous stream of traffic, often with simultaneous take-offs and landings.

. . .

If the above mix of seaplane and land traffic stays within their proper control areas, then there is a minimum of problems. But, often the idea of circumnavigating the Control area seems too much of an inconvenience, predominantly by traffic heading in a northerly direction. This can be tolerable on VFR days. At this time, VFR minimums outside the Control Area and IFR minimums within it are quite similar, so that after an extended period of bad weather VFR traffic caught with a back-log of unfulfilled trips feels pressured to sneak through the Control Area with weather at minimums. As ATC can verify, there is considerable IFR traffic composed of Turbo prop and high-performance business jets. More than one IFR pilot has been terrified upon breaking out to see an unreported aircraft heading north or south across his flight path."

In answer to the suggestion that operations be restricted to airline traffic at certain airports, Mr. Pierre E. Arpin, Director General, Civil Aeronautics, responded:

"Mr. Commissioner, my only comment on that is that this type of recommendation is practical only when we are building new airports. It is very difficult at locations like Dorval or Toronto or Vancouver where private interests have been allowed to invest considerable sums in developing facilities on the airport, to just suddenly dictate to them that they must vacate the airport without having another airport to go to. Mirabel is one example where we can define the role from the beginning and restrict the operations of the little airplanes."
(Emphasis added.)

Regarding the proposed suggestion to restrict airport traffic to instrument flight rules only, Mr. Arpin said:

"Well, restricting traffic to IFR is not a solution, in fact it may complicate matters even more for the controller, for the simple reason that a lot of little airplanes that are now operating under the Visual Flight Rules in and out of the airport, which takes less time for the controller to handle, would now elect to operate under IFR and you would have mixture of a 747 followed by a Cessna 185 and a DC-10 with the additional spacing required and, of course, slowing down the whole stream."
(Emphasis added.)

With respect to restrictions based on the speed of the aircraft, Mr. Arpin testified:

". . . In fact that is the aspect we are looking at right now. We are looking to modify ANO Series V, 19 and we've had some difficulty first of all with the authority which is now vested in the regional controllers, Civil Aviation, to make the judgment as to when and what type of traffic can be restricted. We

have been advised by the legal adviser, Privy Council, that this type of authority cannot be vested in the regional controller. It can't be less than the Deputy Minister level. So this is one problem.

The other one we are having difficulty is reaching agreement on what speed limitations should be applied. It shouldn't be only speed, it's also performance in general, I guess, the rate of -- capability of higher rate of climb or descent. We have even had some politicans tell us that if we make it any less than their own airplanes are capable of doing then we are going to have some difficulty."
(Emphasis added.)

And with respect to the construction of satellite or reliever airports, Mr. Arpin expressed the following opinion:

"There is a policy which has been in existence for many years which provides for the construction of reliever airports or satellite airports to relieve the congestion at a major airport or international airport. What we are lacking is a policy for a second satellite when the major airport becomes again saturated or when the satellite becomes saturated. There was a gentleman's agreement between the former Deputy Minister and Mr. McLeish which provided for our supplying or making the land available and advising industry that the land is available and urging them to develop it . . ."
(Emphasis added.)

At the present time, Toronto International Airport, for example, is authorized to restrict aircraft on the basis of weight. At times during the busiest evening hours, the restriction applies to aircraft with maximum certificated take-off weight of 7,000 pounds or less.

When Mr. Donald E. Lamont was asked whether he thought the traffic mix constituted a hazard, he replied:

"Well if it was a safety hazard they would sure have to close down a lot of airports and a hell of a lot of activity in the country. They are there every day and the thing is you sort them out through Air Traffic Control and separate them and feed them in with the required safety margins. And, you know, there's not much more to do when you reach the congestion at the time. Then you have to establish a satellite airport and get most of that flight traffic out. That is not an easy thing to do sometimes."

COMMENT

Although most witnesses agreed that traffic mix is a problem, there was far from unanimity as to whether, in itself, it was a safety related problem, or one related to the efficient use of our airport facilities in high density areas.

The mix of speed of aircraft requires greater separation to accommodate the flow of traffic into and out of airports. It requires the highest degree of vigilance for all those who are involved. With such an onus, there is some added risk to safety. It is the mix of the speed of the aircraft in particular which is the most significant, and the Air Administration should give serious consideration to restricting operations at high density airports based on the speed of the aircraft.

The complete segregation of aircraft operating under flight instrument rules and those operating under visual flight rules, as proposed by IATA, would obviously best achieve the highest safety objective and would result in significant savings for the air carriers. But this would require the provision of secondary airports for all VFR traffic, and because of the tremendous drain on financial resources that this would entail, it appears to be quite impractical.

The Air Administration is considering a satellite airport when the major airports become saturated, and this program should be pursued.

A feasible solution, but a less expensive one, in high density areas would be to provide parallel runways for use by VFR traffic.

In the meantime, the adoption of the Federal Aviation Regulation Part 93, reproduced above, requiring the operator of an aircraft flying VFR to obtain a departure or arrival reservation from the air traffic controller at a designated high density traffic airport, under the terms set forth therein, would increase the utilization of our present airports and contribute to a safe operation.

It is of some significance, however, that the air traffic controllers, the very people who must accommodate the mix at our busiest airports, regard pilot qualifications as more

critical than aircraft type. It is apparent that special qualifications are needed in the exacting high density terminal environment. One immediate and effective step that can be taken, and which would reduce risk, would be to require proof of pilot competency for those pilots flying in high density airspace.

PART X

AIRCRAFT WITHOUT RADIO (NORDO)

Considerable evidence was presented during the hearings as to the dangerous situation which arises by reason of the absence of two-way radio equipment in so many aircraft in Canada. The situation is obviously most dangerous when such aircraft are in the vicinity of airports where there is considerable traffic. Aircraft without radio also present additional difficulties when pilots of such aircraft are confronted with unexpected weather and need navigational assistance.

The term "NORDO" is used as a description of an aircraft lacking a radio. The term "RONLY" refers to an aircraft with a receiver only. For our purposes both NORDO and RONLY aircraft will be considered together, namely, as aircraft without a functioning two-way radio.

At the present time the Positive Control Zone Order (ANO Series V, No. 21) restricts these aircraft within a positive control zone (PCZ):

> "3. (1) Subject to subsections (2) and (3), no person shall operate an aircraft under VFR into or within a positive control zone unless
>
> (a) the aircraft is equipped with a two-way radio capable of maintaining communications between the aircraft and the appropriate air traffic control unit;
>
> (b) a listening watch is maintained on a frequency that permits the receipt of clearances required by this Order; and
>
> (c) clearance is obtained from the appropriate air traffic control unit during the hours of operation of that unit.
>
> (2) The pilot-in-command of an aircraft without a functioning two-way radio may enter or depart from a positive control zone during day-light hours while VFR weather conditions prevail in the zone, if clearance is obtained from the appropriate air traffic control unit.
>
> (3) Subsection (1) does not apply where the appropriate air traffic control unit is not in operation."

Other than the foregoing restriction, aircraft are allowed to fly anywhere in Canada without a functioning two-way radio.

Many witnesses expressed their concern over this fact. For example, Mr. Michael G. Jeffries, to whom reference has already been made, in his detailed brief on flight service stations, wrote:

> "In addition to the increase in the numbers of pilots and aircraft the aviation industry technology has also advanced resulting in a wider variety, speedier, and larger aircraft coming into the market. The mix of several models of aircraft with varying operating characteristics within the FSS's advisory zone deters a high level of aviation safety if all pilots do not accurately advise the FSS of their position and intentions. <u>Additionally, NORDO aircraft operating within the FSS's advisory zone further decreases the level of safety</u>.
>
> . . .
>
> Resulting from the Cranbrook incident, February 11, 1978 an Ad Hoc Committee was formed in Headquarters and convened September 26 - 28, 1978 to review operating procedures associated with uncontrolled airports; those airports where a Control Tower is not in operation. Three reports, the Pacific, Western and Central, containing numerous aviation safety related items were submitted for review and action by this group.
>
> One of the items contained in Central regions submission concerned NORDO aircraft operating within FSS CZ's and ATZ's Central region recommended all NORDO be banned from operating within CZ's and ATZ's. There was mixed reaction from the committee members resulting in this subject being referred to a task force. Subsequently, DAS and DLI were delegated responsibility for taking appropriate action.
>
> In a letter from PAC to DLI, January 24, 1979, PCA stated, '. . . a better overall advisory service could be achieved if pilots of NORDO aircraft would contact the FSS prior to departure and make known their intentions'. This however did not take into consideration the problem of arriving NORDO aircraft.
>
> An ANO was and is still being discussed concerning 'Position Reporting at Uncontrolled Airports'. The committee soon realized that an ANO could not be quickly legislated so an Information Circular was prepared and distributed. This Information Circular recommended in part, procedures to be utilized for 'VFR Arrivals and Departures NORDO'."
> (Emphasis added.)

The following is an excerpt from that Information Circular:

"Pilots of NORDO aircraft must be extremely vigilant since neither the other aircraft nor the aerodrome service vehicles can be alerted of their presence. It is recommended that arriving aircraft fly a full circuit so that runway availability and traffic can be visually ascertained. Departing pilots shall ensure that the runway is clear and that there are no aircraft on final prior to moving on to the runway. Whenever practical, the FSS or CARS should be informed of intentions when flight planning."
(Emphasis added.)

Mr. Jeffries continued:

"These recommended procedures reiterated good airmanship procedures already contained in the Flight (Service) Information Manual (FIM) and did nothing to resolve the situation."
(Emphasis added.)

The Flight Service Information Manual (FIM) reads as follows:

"Procedures for NORDO Aircraft

NORDO aircraft normally are not permitted to enter or operate within a Positive Control Zone (ANO Series V, No. 21). While flight in other control zones is permitted, pilots should remain continuously alert for visual signals from the tower.

Traffic Circuit - The pilot shall approach the traffic circuit from the upwind side of the runway, join crosswind at circuit height abeam a point approximately midway between each end of the runway and join the circuit on the downwind leg. While within the circuit the pilot shall conform to the speed and size of the circuit, maintaining such separation from aircraft ahead that a landing can be made without overtaking it. If it is necessary for a flight to cross the airport prior to joining crosswind, this shall be done well above circuit height and descent to circuit height should be made in the upwind area of the active runway.

Final Approach - Before turning on final approach, a pilot shall check for any aircraft on a straigh-in-approach.

Landing Clearance - Landing clearance will be given on final approach. If landing clearance is not received, the pilot shall, except in case of emergency, pull up and make another circuit. (Note - Landing clearance may be withheld by the tower when there are preceding aircraft (which have not landed or if the runway is not clear).

Taxiing - No taxi clearance is required after landing, except to cross the runway in use, or to taxi back to a turn-off point. When an aircraft's landing run carries it past the last available turn-off point, it shall proceed to the end

> of the runway and be taxiied to one side, waiting there until clearance is received to taxi back to the nearest turn-off point."
> (Emphasis added.)

On April 18, 1980 a proposed ANO "Air-Ground Radio Frequency" order did not clarify NORDO operating procedures at uncontrolled airports. The Regional Superintendent of Air Regulations for the Pacific Region suggested in an internal memo that VFR pilots who are unable to make reports on the MF shall conform to the circuit procedures for NORDO aircraft, as described under procedures for NORDO aircraft and as outlined in the diagram under "Traffic Circuits - Controlled Airports" contained in NOTAM 1/79 and the FIM.

The suggested procedures include:

> "When ready for take-off:
>
> > the pilot may attract the attention of the airport controller by turning the aircraft toward the tower.
>
> Acknowledgment of Visual Signals - A pilot shall, where practical, acknowledge all clearances and instructions received by visual signals as follows:
>
> > full movement of rudder or ailerons, whichever can be most easily seen (such movement should be repeated at least 3 times in succession), or by taxiing the aircraft in the authorized direction."

Mr. Jeffries' brief added:

> "A draft ANO 'Communications Procedures for VFR Operations' order Series V No. 34 was prepared and included a section concerning aircraft without radio that stated, 'join the circuit pattern in a position which will require the aircraft to complete two sides of a rectangular circuit before turning on to the final approach landing'.
>
> On February 21/80 the ATS/Aeradio review again considered Central regions recommendation C22 that requires NORDO not be permitted in CZ's or ATZ's. <u>It was decided DSL-Ottawa would examine the need to extend the policy as it applies to a PCZ; to ban NORDO aircraft from other types of controlled airspace</u>.
>
> . . .

An observation concerning the NORDO problem revealed that virtually no action has been taken to resolve this situation other than reiterate recommended operating procedures already contained in FIM and, as a result a mix of radio-equipped and NORDO aircraft has been permitted to continue creating unsafe aviation safety situations."
(Emphasis added.)

Mr. Jeffries included several incident reports that illustrate the danger. In the following example "FUQA" is a light single-engine aircraft:

"1Ø2Ø41Z FUQA REPORTS PASSING UNDER DC 6 - SBND THRU ZONE AT 14ØØ FT ALONG SHORELINE. PILOT OF FUQA STATES 'TOO CLOSE FOR COMFORT, DISTANCE BETWEEN ACFT ABOUT 1ØØ FT.

FSS HAD NO RADIO CONTACT WITH DC6 (CONAIR 448)"

Many other witnesses addressed the same issue.

Mr. Michel Chouinard of the Mont-Joli Flight Service Station:

"Although the FSS all have radio communication with these vehicles, the problem arises as concerns aircraft that are not equipped with radio (NORDO). There is no regulation or order obliging owners of aircraft to equip themselves with radios. These aircraft can thus land and take off at uncontrolled airports without informing the flight service station. The station, not having an adequate view of the runway and having no contact with the NORDO aircraft, cannot warn vehicles or aircraft in the area. This is a very dangerous situation which must be corrected as quickly as possible." (+)
(Emphasis added.)

In a similar vein, the Public Service Alliance of Canada (PSAC):

"It should be made mandatory for all aircraft to be equipped with an operational two-way radio. The pilot should be required to advise the FSS of any change in flight location or manoeuvering within the airport boundaries."

Captain Frank Davies, a Nordair pilot:

"A . . . We would definitely like to see aircraft equipped with two-way serviceable radio at all times. We feel that in this day and age all

aircraft should be equipped with a serviceable two-way radio for safety reasons.

Q *Particularly where there are mandatory frequencies. It's pretty hard to use the frequency if you don't have a radio.*

A *Absolutely.*"
(Emphasis added.)

Although the overwhelming weight of the evidence favoured a requirement that all aircraft be equipped with a two-way radio, not all witnesses agreed. Mr. Charles F. Burbank, Canadian Executive Secretary, International Flying Farmers, and an experienced Air Canada pilot, was questioned as follows:

"Q The mandatory frequency plan does not apply to aircraft that don't have a radio, understandably. But yet they are permitted in that zone. Why should they be permitted in any zone where mandatory frequency has been established?

A The intention, as I understand it, is to establish a mandatory frequency at every airport and aerodrome in Canada, if I understand Transport Canada's intention correctly.

Many aerodromes, many unlicensed airports which have no ground base facility have a very low volume of traffic, as I indicated. *In some cases flying farmers' strips may not see movement for several days at a time. I do not see any compromise of safety by allowing aircraft without radios to operate in and out of these fields.*"
(Emphasis added.)

Captain Burbank further testified on the need for a radio:

"I do not see the necessity for one. You can always make the case, I suppose, that it would be safer, marginally safer to have a radio on every aircraft against the day when an engine quits and he can say May Day and hope that somebody can hear him, somebody happens to be on the emergency frequency. *But to put an aircraft radio in some older antique aircraft, and I have a couple of them based on my strip, would impose such an economic hardship on the aircraft owner that it would not be worth it. Nothing would be gained.*

These antique aircraft rarely fly more than 10 miles away from my place. What's to be gained by putting a radio in? I really don't see any gain."
(Emphasis added.)

Mr. W. T. Tweed, past President and Chairman of the Board, Northern Air Transport Association, categorically took the opposite view to that of Captain Burbank when he stated:

> "And situations in our other recommendations for aircraft operating in the North and out of these air strips is that we don't feel there should be any NORDO, anywhere, anywhere. We feel that the only place that NORDO aircraft should be able to operate is into a facility where it can have its radio fixed."
> (Emphasis added.)

COMMENT

It is axiomatic that an aircraft with a functioning two-way radio is safer than one without. The evidence clearly established that NORDO aircraft pose a safety risk not only to other aircraft, but also to the pilot, and passengers if any, of the NORDO aircraft itself.

In many parts of Canada, aircraft, even at low altitudes, are within the range of a direction finding (DF) service at a control tower or flight service station. If a pilot is lost or disoriented or the engine of the aircraft fails, the pilot cannot even communicate his distress, let alone receive guidance to the nearest airport. He cannot change his flight plan in the air, cannot receive current weather information, cannot receive notices to airmen and cannot keep in tune with air traffic.

It seems somewhat incongruous that, in the present day, aircraft should be permitted to take their place in the airways and take-off and land at airports without such minimum safety equipment. It is unlikely that a person who can afford to maintain and fly an aircraft would suffer great economic hardship if required to equip it with a two-way aircraft radio. I do appreciate that to have to equip the type of older aircraft described by Captain Burbank with radios might make their use uneconomic.

However, I am satisfied that, in addition to the areas where NORDO aircraft are presently not allowed to operate, only aircraft equipped with a functioning two-way radio should be permitted to operate within a mandatory frequency zone of any aerodrome licensed by Transport Canada, except, of course, in cases of emergency. This

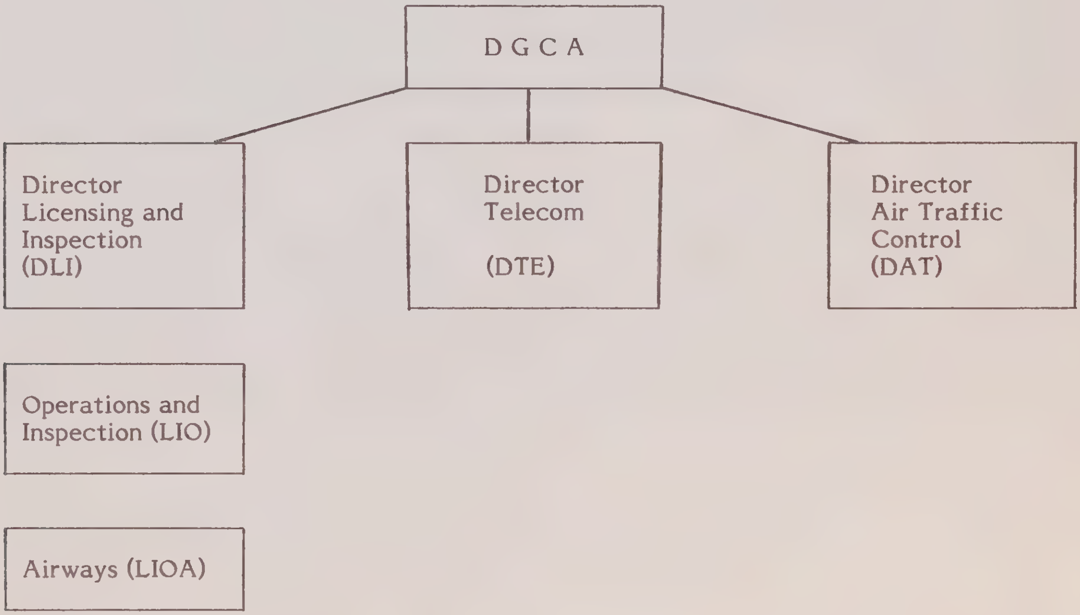
would still permit NORDO aircraft to fly within the vicinity of aerodromes which are unlicensed and thus not classified as airports, and take-off and land at such aerodromes. Those owners of antique aircraft and flying farmers, who use aircraft for agricultural purposes or to fly from one unlicensed aerodrome to another, would therefore still be able to carry on their activities with NORDO aircraft.

PART XI

THE PRESENT CATA ORGANIZATION

CATA divides its activities into three broad categories, the terminal, the vehicle and the way. The provision of air navigational facilities and services falls within the third category, the way, but there is a interrelationship and interdependence between navigational aids and the terminal and the aircraft.

At present, two branches and one section are primarily responsible for the provision, maintenance and operation of navigational aids. The branches are the Telecommunications & Electronics (Air) Branch (Telecom), and Air Traffic Control. The section is Air Facilities Requirements and Inspection, commonly referred to by its previous name, "Airways", and it is part of the Operations and Inspection Division which in turn is a part of the Licensing and Inspection Branch. The directors of Licensing and Inspection, Telecom and Air Traffic Control all report to the Director General, Civil Aeronautics. This organization is depicted on the chart set out below.



The primary functions of each of these sub-organizations are as follows:

1. Telecommunications & Electronics (Telecom) provides engineering and technical services in the procurement and maintenance of navigational aids. Flight service stations and flight service specialists are also within Telecom.

2. Air Traffic Control is responsible for the operation of the air traffic control facilities principally through its employment of air traffic controllers.

3. Air Facilities Requirements & Inspection (Airways) - This section monitors, reviews and recommends for approval the operational requirements for air navigational services including the requirements for Air Traffic Control Services and Flight Service Stations. These requirements originated in the Regional Airways' Sections. As a result of a reorganization in 1973/74 the responsibility for standards was transferred to the Standards & Licensing Branch. In addition, the responsibility for many operational requirements for certain airside projects including lighting of runways and vasis was placed under the control of the Airports and Construction Directorate.

This division of responsibility has proven to be unsatisfactory and has contributed in large measure to the delay in solving the many problems referred to in this Chapter. The unacceptable delay in the Radar Modernization Program (RAMP) can be largely attributed to the competing and divergent views of Telecom and Air Traffic Control. As was noted earlier, this problem was identified in the Operations Review entitled "Management of the Air Navigation System" which under the heading "Chapter IV, Policies, Procedures, Standards and Operations" made this observation:

> "The independence of ATS and T & E Manuals of Operation is a cause for concern in some areas, as indicated earlier. The approval level of these documents is a concern for some in DSL and a certain lack of procedural conformity in overlapping areas of responsibility and interface with the industry does appear to be a concern for some.
>
> Both Telecommunications and ATS have separate elements involved in the process of procedures development - TAFO and ATP; in DLI there is LIOA. Each group works independently in establishing procedures according to their functional responsibilities with little cross-fertilization of information or consultation."

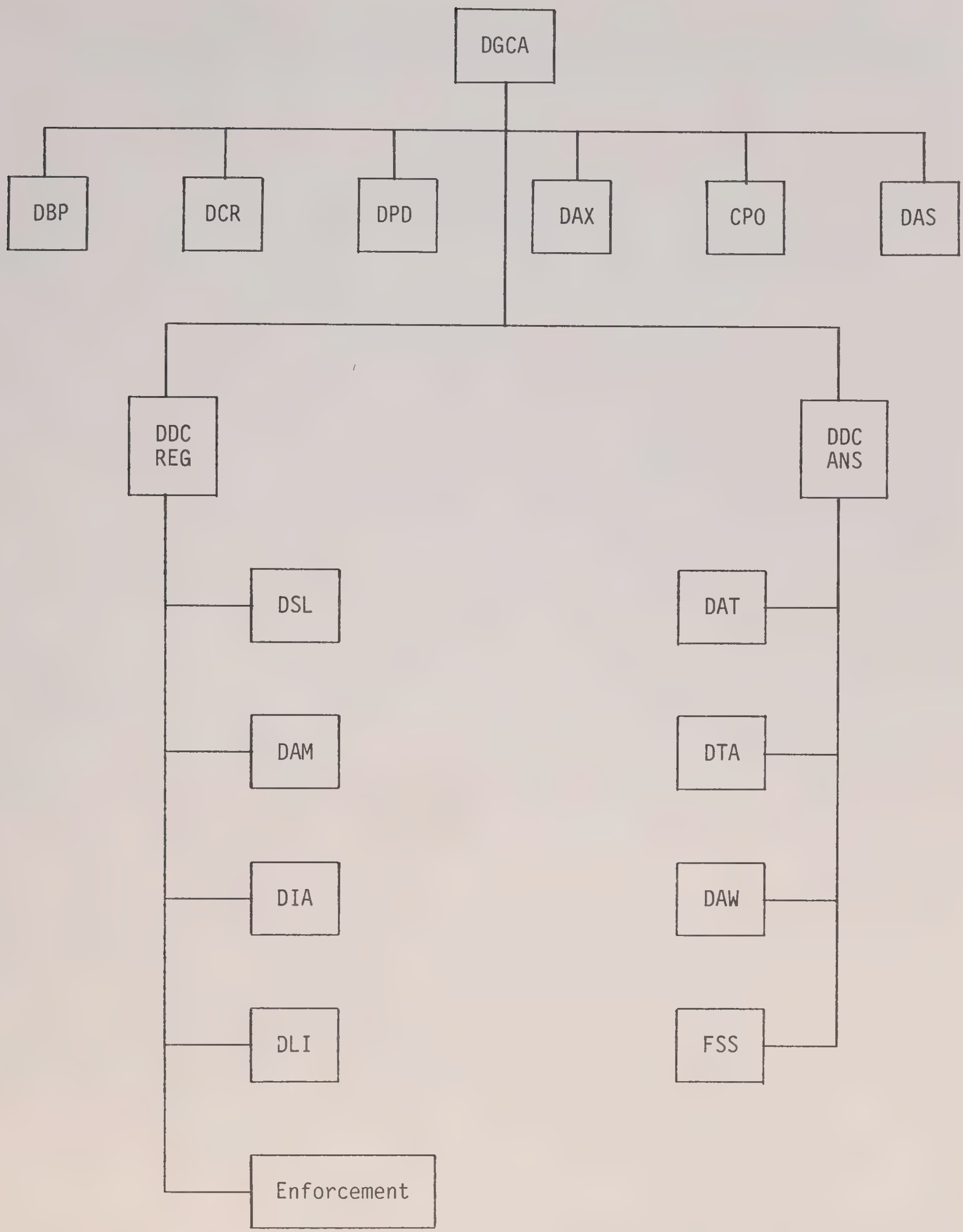
That report posed the following rhetorical question:

> "How can the operational procedures of both ATS and T & E be complementary when they are developed by two separate operating agencies working independently with divergent degrees of operation decentralization?" (Emphasis added.)

The division has also led to the inability to obtain more decisive action concerning the respective functions of air traffic controllers and flight service specialists, and the many other problems with respect to uncontrolled airports previously discussed.

CATA'S PROPOSED REORGANIZATION

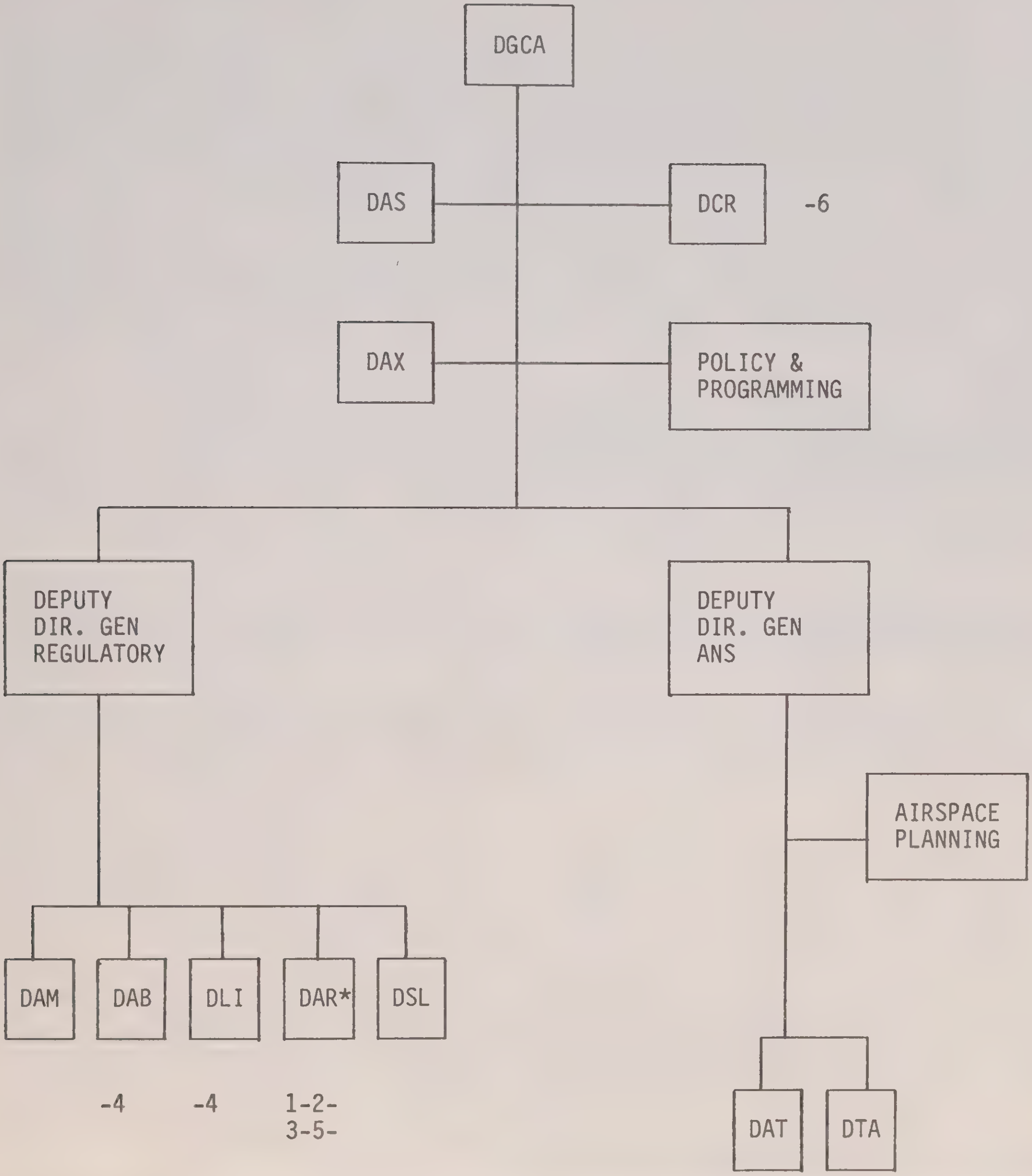
The need for reorganization of the CATA structure in this area has been under consideration by the Air Administration for some time. On the last day of the hearings, the Air Administration submitted the following draft of a proposed reorganization which, in diagrammatical form, is set out below:


DGCA
DBP
DCR
DPD
DAX
CPO
DAS
DDC REG
DDC ANS
DSL
DAM
DIA
DLI
Enforcement
DAT
DTA
DAW
FSS

Subsequently, a more refined proposed reorganization was submitted by CATA to the Commission by a letter dated May 15, 1981, which, if implemented, would be as follows:

ORGANIZATIONAL CHANGE

MOST VIABLE ORGANIZATIONAL STRUCTURE TO COMPLEMENT THE CONCEPT IS



1-2-3-4-5-6- RESPONSIBLITIES DESCRIBED IN AERONAUTICAL SYSTEM REQUIREMENTS CONCEPT

* DIRECTOR - AERONAUTICAL SYSTEM REQUIREMENTS

<u>COMMENT</u>

It is apparent that the basic reorganization as first proposed by CATA would be to retain the separate existence of an Air Traffic Control Branch and a Telecom Branch under their respective directors. Airways would be upgraded to Airspace Planning, also presumably to be presided over by a director. Flight Service Stations would also be upgraded into a branch. All four branches would report to a Deputy Director General of Air Navigation Services who is interposed between them and the Director General, Civil Aviation.

In the more recent proposed reorganization the basic concept would be the same except that DAW would become Airspace Planning and FSS would again become part of Telecom.

The proposed reorganization is premised on the all too familiar solution of most bureaucracies, that is, to add more managers. In response to this criticism, the following exchange between Counsel to the Commission and the Administrator took place:

> "(Sopinka) Q Without any disrespect the new way of life seems to add to administration, and Mr. Lowry felt it was already top heavy, what do you say about that?
>
> (McLeish) A Well we don't control that, Mr. Sopinka. I guess I would share your concern and Mr. Lowry's, but that is the environment in which we live."

Not everyone agreed that bureaucratic growth is a necessary fact of life. In a statement provided to the Commission at its request by Mr. J. B. Lawrence, Superintendent, Air Facilities Requirements and Inspection (Airways), Mr. Lawrence observed that:

> ". . . <u>The decision-making processes are burdened with layers of bureaucracy and the organization is too unwieldy for a prompt, coordinated response to the operational requirements of civil aviation</u>. While lip service is paid to the principle that the Air Traffic Services and the Telecommunications Branches are responsive to the Operational Branch, the Operational Branch does not have the resources and the coordinating level for functional control is too high to effect the required response.

Effectively, these Branches are independent and respond reluctantly. The users, the civil aviation industry, are ultimately deprived of the advantages that might be gained by an Air Administration more effectively responsive to their requirements."
(Emphasis added.)

As has been previously noted, many of the problems can be attributed to the fact that the flight service specialists and the air traffic controllers are governed by separate branches. The difficulties which this division has brought about were commented upon in the report of the Pacific Region entitled "Study of Communications Interface at Uncontrolled Airports". In a portion of the report, previously reproduced, the following conclusion and recommendations were made:

"CONCLUSION:

The CATA control and advisory services are functioning as separate entities, rather than as complementary parts of a unified air traffic services system. A lack of appreciation for one another's roles in the system is symptomatic of an organizational structure which has failed to adapt to the realities of the day.

RECOMMENDATION:

That a decision be made immediately at the most senior level in the Air Administration to reorganize the management of the control and advisory functions now contained in two Branches into one Branch.

In order to accomplish this without the need for another elongated study, that an implementation committee be formed, comprising representatives from all Branches within the ANS activity and stating a target date for implementation.

DISCUSSION:

The areas of responsibility of each agency are not clearly defined, partly because the definition of responsibilities arise from two different managerial sources. It is unreasonable to expect Branch Managers to be completely familiar with the policies and procedures of another Branch, and even more unreasonable to expect their employees to be fully conversant with each others' duties and responsibilities. It would appear that for maximum efficiency, only one agency should be responsible for the provision of the entire control/flight advisory service.

It was observed that in the United States there was a career progression between air traffic controllers and flight service operators - in both directions. This movement of personnel is greatly facilitated as a direct result of both services being part of one Branch.

The Telecommunications and Electronics Branch has become fragmented into two groups. One group provides a service (radio operators) and the other group, maintenance (technicians). It would seem that the service function would have more in common with ATS goals than with the maintenance side of T&E.

Advantages of such a reorganization would include:

- this organizational structure is internationally accepted;
- proper training and knowledge would be assured, areas of overlap would be eliminated;
- areas of responsibility could be set out and followed;
- a greater rapport between controllers and aeradio operators would be achieved; and
- a more flexible career progression would be possible. The RO's would utilize ATS training facilities to a greater degree."

(Emphasis added.)

In my respectful opinion the reorganization proposed by the Air Administration adds an additional and unnecessary level of management and, if implemented, would not provide a solution to the basic problems.

In order to eliminate the unproductive competition between the various agencies that now provide air navigational facilities and services, the artificial barriers that separate them should be eliminated. This could best be accomplished by the establishment of a unified Air Navigational Service Branch which would embrace the present Air Traffic Control Branch, the Telecom Branch and the Airways Section. It should be headed by a director responsible to the Director General, Civil Aeronautics. The present Air Traffic Control Branch, the Telecom Branch and the Airways Section should become sections of the Air Navigational Service Branch. The responsibility for flight service stations and flight service specialists should be assigned to the Air Traffic Control Section of the Air Navigational Service Branch, leaving the Telecom Section as the engineering and maintenance arm of the new unified Air Navigational Service Branch.

With such a reorganization, I am confident that the Air Administration would be able to respond to aviation safety system deficiencies and implement any necessary changes in a more immediate and effective manner than is presently the case.

PART XII

RECOMMENDATIONS

AN AIR NAVIGATIONAL SERVICE BRANCH

1. The creation of a unified Air Navigational Service Branch within the Canadian Air Transportation Administration.

2. The Air Navigational Service Branch should be headed by a director who should report to the Director General, Civil Aeronautics.

3. The present functions and activities of the Air Traffic Control Branch, the Telecommunications & Electronics (Air) Branch and the Airways Section should be assumed and become the responsibility of the Air Navigational Service Branch.

4. Air Traffic Control, Telecommunications & Electronics (Air) and Airways should become sections within the Air Navigational Service Branch.

5. Flight service specialists presently within the Telecommunications & Electronics (Air) Branch should be assigned to the Air Traffic Control Section of the Air Navigational Service Branch with the view that the Telecommunications & Electronics (Air) Section be the maintenance and engineering arm of the Air Navigational Service Branch.

6. A comparable Air Navigational Service Branch should be established in each of the regions.

CONTROLLED AIRPORTS

7. The Air Administration should undertake a re-evaluation of all uncontrolled airports to determine whether a control tower is required at any of them.

8. In conducting the re-evaluation, the Air Administration should review the present criteria for the determination of the need for a control tower.

9. In the determination of whether a control tower is required, traffic should be the major but not the single criterion. Other factors such as the nature of the aircraft, their size and speed, the mix of traffic and the number of passengers being transported should also be taken into consideration in determining the appropriate criteria.

10. The program to reduce service during the quiet hours at those airports at which a control tower is presently in operation should not be resumed until the criteria for doing so have been re-examined and re-appraised in consultation with the aviation community and the local residents who are serviced by such control towers.

RADAR

11. The Air Navigational Service Branch should assume the responsibility for the finalization and implementation of the Radar Modernization Program.

12. The Air Navigational Service Branch should give the highest priority to an acceleration of the Radar Modernization Program with a view to replacing the present obsolete radar equipment as soon as possible.

13. The acquisition of new major equipment or systems should, whenever possible, be through the purchase or rental of "off-the-shelf" equipment rather than on the basis of an in house design.

14. The Air Navigational Service Branch should undertake a program for the relocation of uninterruptible power units which do not comply with present guidelines.

15. The Air Administration should impose a limitation on the use of the major airports, when such airports are operating at peak hours, by aircraft without transponders.

TERMINATION OF KENORA PRIMARY RADAR

16. The primary radar system at Kenora should be retained until equipment is available which is capable of performing the same functions as are presently being provided.

FLIGHT SERVICE STATIONS

17. The Air Navigational Service Branch should re-evaluate the criteria for the determination of the need for the installation of flight service stations. In such a re-evaluation traffic should not be the major criterion, but consideration should be given to terrain, weather or other hazardous flying conditions.

18. A flight service station should be established at those airports which are serviced by a scheduled air carrier where no flight service station presently exists.

19. All new flight service stations should be constructed so as to provide the flight service specialist with a clear view of the ramps, runways and approaches.

20. Flight service stations which do not afford the flight service specialists with a clear view of the ramps, runways and approaches should be relocated where present facilities exist.

21. A standard building design should be adopted for all new flight service stations.

22. Flight service specialists should be given the authority to control the presence of vehicles on the airside of an airport by the implementation of a positive vehicle advisory service.

23. No vehicle operator should be permitted on the airside areas of airports unless properly certified.

COMMUNICATIONS AT UNCONTROLLED AIRPORTS

24. The Air Navigational Service Branch should convene a meeting of Headquarters and Regional personnel together with interested parties to review the Mandatory Frequency Guidelines in light of operating experience.

25. In preparation for such a meeting, appropriate Regional personnel should prepare with respect to each airport in their regions:

(i) the proposed height of the cap of the Mandatory Frequency Zone for uncontrolled airports in the region;

(ii) the area of the Mandatory Frequency Zone where it is proposed on the basis of operating experience to vary it; and

(iii) the area of the Positive Control Zone where it is proposed on the basis of operating experience to vary it.

26. The Air Administration upon receiving the recommendations emanating from such a meeting should amend the Mandatory Frequency Guidelines if, in its opinion, the amendment or amendments are warranted, having regard to operating experience and the changes suggested at such a meeting.

27. All operative provisions of the Mandatory Frequency Guidelines, or any amendments which result from the review, should be made mandatory.

28. The Mandatory Frequency Zone should be capped at a height which would ensure that aircraft in the area of serious potential conflict are required to communicate on the designated mandatory frequency.

29. The mandatory frequency designated during the period when a control tower is closed should be the tower frequency, unless operating experience shows that pilots are being confused by the use of such frequency.

30. Reports required to be made by pilots should not be broadcast unless there has been no response from a ground station, or unless no ground station exists at the relevant location.

THE PROVISION OF OTHER AIR NAVIGATIONAL FACILITIES AND SERVICES

31. The Air Navigational Service Branch should assume the responsibility for the National Airspace Plan and all other planning with respect to the provision of new navigational aids or the replacement of existing navigational aids.

32. The Northern Ontario Area Master Plan should be circulated to air carriers, the Chiefs of the Treaty #9 Indian Bands and members of the public affected for their consideration and comment.

33. The Air Navigational Service Branch, after receipt of any recommendations following the distribution of a National Airspace Plan, should undertake a review of the plan.

34. In the determination of the necessity for other navigational aids, such as directional beacons and instrument landing systems, traffic should not be the major criterion to be applied. In the review recommended, greater regard must be given to the safety related requirements which result from the special hazards encountered when flying into airports in the remote areas, and to the fatal and other accidents attributed to the absence of navigational aids. Consideration should also be given to the method used by the Federal Aviation Administration for the quantifying of the safety benefits as a result of the installation of navigational aids.

35. Transport Canada, in association with other appropriate governmental agencies, should immediately embark on a program to train native people in the remote areas of Canada in order to provide them with the skills required for radio operations, airport maintenance and weather data interpretation, and thus enable them to provide advisory service to aircraft similar to the program referred to as the Arctic Airports program established in the Yukon and the Northwest Territories, and to the program in Northern Manitoba.

A GROUND PROXIMITY WARNING SYSTEM

36. A Ground Proximity Warning System should be made mandatory for all aircraft engaged in the carriage of passengers for hire.

TRAFFIC MIX

37. The Air Navigational Service Branch should give consideration to the establishment of satellite airports for use by VFR aircraft where major airports have become saturated by reason of traffic.

38. Where a satellite airport is not feasible, parallel runways at high density traffic airports should be considered for use by VFR aircraft.

39. As an interim solution, the Air Administration should adopt a regulation similar to the Federal Aviation Administration Regulation Part 93 which would require an operator of an aircraft flying VFR to obtain a departure or arrival reservation from the air traffic controller at designated high density traffic airports.

AIRCRAFT WITHOUT RADIO (NORDO)

40. In addition to the areas where they are not presently allowed, aircraft not equipped with a functioning two-way radio should not be allowed to operate within the Mandatory Frequency Zone of any aerodrome licensed by Transport Canada, save in cases of emergency.

AIR TRAFFIC CONTROLLERS

41. Air Traffic Controllers should receive frequent recurrent training in the procedures and methods to be adopted by them in the event of radar failures.

CHAPTER II

SEARCH AND RESCUE (SAR) AND EMERGENCY LOCATOR TRANSMITTERS (ELTS)

INTRODUCTION

When an aircraft is overdue, Transport Canada alerts the Rescue Coordination Centre of the Department of National Defence and gives the centre all the information at its disposal. At that point the Rescue Coordination Centre of the Department of National Defence takes over the search and rescue operation. The Department of National Defence assumes two major responsibilities: firstly, to coordinate all search and rescue activity involving air distress, as performed by four rescue coordination centres across the country situated in Halifax, Trenton, Edmonton and Victoria, and, secondly, the direct operational role of providing the aircraft and personnel to perform search and rescue operations.

Lieutenant Colonel John Edward Dardier, Section Head of Search and Rescue, Director of Air Operations and Training, National Defence Headquarters, explained the role of his group when being questioned by Mr. Ouellet as follows:

> "A ... The responsibility of the Department of Defence is to perform the search and the rescue.
>
> Q Once you find the aircraft some time thereafter the accident investigation team from DOT moves in?
>
> A Yes. I think it would be useful to say we are not particularly interested in looking for the crumpled tin. What we are interested in finding is the people. However, the aircraft obviously is easier to see in many cases.
>
> Our objective is to find these people in as good condition as we can, perform as advanced first aid as is necessary - and this is usually performed by the search and rescue technicians who either parachute in or go in by helicopter. They perform this and evacuate them as soon as they can to medical services, a hospital, if there is one close by."

The entire search and rescue operation in Canada, which is not limited to the field of aviation, costs the various government departments and services approximately $100 million per year.

An emergency locator transmitter (ELT) is a radio transmitting device designed for use on board aircraft to assist the search and rescue operation (SAR) after an aircraft accident. The device assists the SAR team in their efforts to locate the whereabouts of the downed aircraft by transmitting a manually or automatically activated homing signal when the aircraft impacts with the ground.

In 1979 the Department of National Defence spent more than $8 million searching for downed aircraft that were not carrying emergency locator transmitters. A relatively short simple search can cost anywhere in the vicinity of $35,000 and major efforts are considerably more expensive. More significantly, the absence of emergency locator transmitters reduces materially the likelihood of the success of the search and rescue operation. The absence of emergency locator transmitters is becoming even more critical.

Canada is presently preparing to launch, in cooperation with other countries, an experimental search and rescue satellite, known as SARSAT; the launch date is scheduled for April 1982. Canada has committed roughly $11½ million to the SARSAT project. Colonel Dardier explained the role of SARSAT and its relationship with ELTs as follows:

> "If an ELT goes off in, let us say, a remote area, right now there is a high probability that nobody will even hear it going off. SARSAT is a piggy-back operation, if you like, on U.S. weather satellites. They are in polar orbit . . . which means they do one revolution every two hours or so. And at the start we are planning on having devices which receive and re-transmit the ELT signal.
>
> This re-transmitted signal is then picked up, and the first thing you do is you identify the fact that there is a distress. . . .
>
> Now the processor does one more thing. It measures the changing of frequency which occurs because the satellite is tracking at a finite speed, just as you will notice a change in frequency of a train whistle as it goes past you. And it can locate a line either side of this track where the ELT is probably going off.
>
> On the second pass you will identify whether it was on the left or the right. And it will give you an area where there is a fairly high probability that the distress will be located. Obviously the more precise an ELT in terms of its transmitting frequency the more accurate SARSAT will be able to pinpoint the location."

Colonel Dardier, when examined by Mr. Ouellet, went on to testify as follows:

> "Q And I understand that your SARSAT program is totally dependent upon functioning ELTs?
>
> A It is, yes. If you don't have ELTs, SARSAT doesn't hear anything; it doesn't tell us."

Emergency locator transmitters are not only important to the SARSAT program, but also play a major role in the preservation of life. In this respect Colonel Dardier made the following observation:

> ". . . <u>People are dying and suffering in the field and each year we carry out a number of searches for people who are not carrying ELTs</u>. It takes us a very long time to find people; sometimes in the order of two weeks or three weeks, or occasionally, we don't find them at all, and, really, the bottom line is that people are suffering and dying. That's the most important thing, and then, of course, on top of this, where you are spending unnecessary flying hours, there is a significant cost associated with that type of search."
> (Emphasis added.)

PART I

RESPONSIBILITY FOR SEARCH AND RESCUE

The exact nature of the responsibility of the Minister of Transport for search and rescue has been the subject of considerable debate for many years. Mr. C. K. Kennedy, Assistant General Counsel with the Department of Transport, wrote to Mr. R. J. LeBlanc on April 5, 1978 in the following terms:

> "I write with reference to our discussions of today's date wherein you queried this writer as to the scope and nature of the Minister of Transport's responsibilities under section 3 of the Aeronautics Act.
>
> In our discussions, during which I expressed certain amusement arising over the fact that this seemed to be an old chestnut, I indicated that while the Minister's powers under section 6 to make regulations with the approval of the Governor in Council was restricted to the control and regulation of air navigation over Canada, including the territorial sea of Canada, the duties imposed upon the Minister under section 3 were much broader to say the least.
>
> For a number of years when confronted with the limitations which appeared to be imposed on the regulation making power under section 6, this writer advocated that section 6 of the Act be altered in a form and manner which would ensure that the regulation making powers were fully as broad as those duties imposed upon the Minister under section 3. The mere fact, however, that section 6 does not presently enable the Minister to make regulations in the broadest sense of the duties imposed under section 3 in respect of aeronautics does not relieve, in my view, the Minister of Transport from using his powers as a federal Minister to supervise all material connected with aeronautics and to use his good office for the purpose.
>
> In my view, Parliament imposed such broad duties upon the Minister in light of the exception provided for in section 2 with respect to those limited 'matters relating to defence'. Quite obviously, having ensured that the Minister of National Defence would continue to exercise his powers in that specific field, it was necessary, by virtue of the very nature of aeronautics, to ensure that the Minister of Transport's duties in the general field of aeronautics were clearly identified. Such was the thrust of section 3, and in my view, the Minister of Transport has a very clear duty imposed upon him by virtue of the generality of the duties enunciated in section 3 to show a very keen supervisory role in the field of search and rescue where aeronautics is concerned! In this context, I think it must be appreciated that the statute in respect of which you have requested an interpretation is a statute dealing with the general subject of aeronautics and, therefore, I would regard a failure of the Minister to exercise supervisory responsibilities in connection

with search and rescue (where aircraft are concerned) as an abdication of the responsibilities imposed upon him by Parliament in respect of aeronautics." (Emphasis added.)

One month later on May 11, 1978 the Departmental General Counsel, Mr. W. J. A. Hobson, wrote in the following terms to the Director General of Civil Aeronautics:

> "RE: Responsibility, Search and Rescue
>
> Under a memorandum dated April 5th, 1978, Assistant Departmental General Counsel advised CPR (Mr. R. J. Leblanc), as a follow up to certain brief discussions held with Mr. Leblanc, that in his opinion the Parliament of Canada under the provisions of the Aeronautics Act, Chapter A-3, R.S.C. 1970, and more particularly section 3 thereof, appeared to have imposed upon the Minister of Transport, in a broad and substantial form, a general duty to supervise all matters connected with 'aeronautics'. In Mr. Kennedy's memorandum, it was suggested that the generality of the duty imposed upon the Minister under section 3 of the statute appeared to exceed somewhat the powers of the Minister to make regulations for the purpose of controlling and regulating 'air navigation' over Canada -- see section 6 of the Aeronautics Act.
>
> In the advice provided under the memorandum of April 5th, 1978, Mr. Kennedy continued to suggest that, bearing in mind the nature of aeronautics and the manner in which responsibility for civil aviation had been vested in the Minister of National Defence at the time the Aeronautics Act was originally enacted, Parliament obviously deemed it important to enunciate in clear and precise terms the general responsibilities of the Minister of National Defence in the field of civil aviation as distinct from the responsibilities of that Minister in matters of aviation related to defence.
>
> With the enactment of the Department of Transport Act in 1936, and the subsequent amendment of the Aeronautics Act for the purposes of confirming the Minister of Transport's responsibilities in civil aviation matters, Parliament obviously wished to continue the distinction between ministerial responsibilities for aeronautics where civil aviation was concerned from the responsibilities of the Minister of National Defence where matters of defence were involved. Accordingly, where the 'Minister' for the purposes of the Aeronautics Act of 1919 had been identified as the Minister of National Defence, that identification was changed subsequent to the passage of the Department of Transport Act in 1936 through the introduction of an amendment, the effect of which was to identify the Minister of Transport as the 'Minister' for the purposes of the Aeronautics Act, save where matters relating to defence were involved where the 'Minister' was identified as meaning the Minister of National Defence for Air -- see Chapter 28, Statutes of Canada, 8-9, George VI. Section 2 of the Aeronautics Act, Chapter A-3, R.S.C. 1970, continues to carry such distinction.

In light of the foregoing, and in the absence of any factual presentation or documents suggesting that the Minister of Transport had somehow effectively delegated or assigned certain of his general responsibilities to the Minister of National Defence, Mr. Kennedy concluded that where missing aircraft were concerned, the general duties imposed upon the Minister under section 3 of the Aeronautics Act implicitly carried with them a responsibility in the field of aircraft search. Such general duties in the particular area were, in his view, supported by the actions of Parliament under section 6 wherein the Minister of Transport was specifically granted regulatory power for safety purposes and specific powers to investigate an aircraft accident. Obviously, in order to investigate the misadventures surrounding a lost aircraft, it is necessary to first locate the same, and thus the specific powers under section 6, as granted by Parliament, appeared to support the general responsibilities assigned to the Minister under section 3 of the statute.

I can only speculate that you are either concerned that Mr. Kennedy's views might suggest some undesired restrictions on existing practices or that his view might be the basis for some movement to increase existing Department of Transport responsibilities and activities in the search and rescue field by seeking a stronger role for the Air Administration. My impression from our brief conversation is that the latter is an important consideration from your point of view.

It would appear that most of the flagged materials consist of minutes of meetings of the Interdepartmental Committee known as 'ICSAR' which was established in 1976 pursuant to a cabinet decision of November 4, 1976. The original cabinet decision was not entirely clear on the scope of the matters to be dealt with by this Interdepartmental Committee. In fact, the memorandum to cabinet resulted in the cabinet decision and the cabinet decision itself dealt almost exclusively with search and rescue with respect to vessels that are lost or in distress. However, there is a reference in Annex A to the cabinet decision, which Annex apparently details the responsibilities of the Secretariat of the Committee, to a responsibility for 'Air SAR and Co-ordination' and an indication that this responsibility is mainly one of DND. The cabinet decision called for the designation of a Minister to act as the governmental spokeman on search and rescue matters. Consequently, the Prime Minister in a letter to the Minister of Transport dated December 1, 1976 stated as follows:

> 'I believe it is important that a single Minister be designated to speak for the government on overall search and rescue matters. Because of his already broad role in this area, which includes responsibility for the operation of the rescue centres from which all SAR activities are co-ordinated and the responsibility for air SAR, I am of the opinion that the Minister of National Defence should serve as lead Minister and spokesman for the government on all SAR matters.
>
> My decision does not involve any change in current departmental SAR responsibilities and officials involved in SAR activities will continue to report to their departmental Minister as at present for the actual operational effectiveness of departmental equipment dedicated or

tasked to search and rescue. In the planning and co-ordination of overall SAR activities, however, and in all other SAR matters involving more than one department, the involved officials will not have an additional reporting relationship to the lead Minister through the interdepartmental committee.'

It is not entirely clear to me precisely what the respective roles of the two main departments, i.e., DND and DOT, are to be and whether there was intended to be any change from a status quo (by that I mean the roles as they are in practice and not necessarily as indicated by any legislation). Notwithstanding the Prime Minister's reference to the Minister of National Defence as 'lead Minister and spokesman for the Government on all SAR matters' it would appear that the two co-chairman (DND and DOT) of ICSAR, at their meeting of May 4, 1977, agreed that there is no lead department for search and rescue in Canada but that it is a co-operative effort between several departments.

Following the Prime Minister's letter, the Air Administration was eventually involved in the expanding aeronautics responsibility of ICSAR. As a matter of interest, the files indicate that as far back as the mid 50's, there were in existence interdepartmental committees and other meetings of co-ordination in search and rescue matters between DND and DOT.

With respect to Mr. Kennedy's opinion, I can only endorse it since it seems to me that section 3 of the Aeronautics Act and paragraph (a) in particular could clearly be interpreted as imposing a duty on the Minister of Transport to supervise search and rescue operations insofar as they are connected with the Aeronautics. In other words, I agree with Mr. Kennedy that search and rescue with respect to aircraft does seem to be a matter connected with aeronautics.

While the Minister of Transport is certainly empowered to delegate or assign such responsibilities to others, there appears to have been nothing provided under the memorandum to DGCA dated May 3rd, 1978, nor, indeed, by your counterparts in the Department of National Defence to suggest that the Governor in Council has assigned any duty or function in air search and rescue to the Minister of National Defence or, indeed, to any other Minister -- see section 2 of the Aeronautics Act, Chapter A-3, R.S.C. 1970. In the event it were the Minister's desire to effectively transfer duties and responsibilities to another Minister, there exists, of course, the statutory vehicle which would enable the Minister to effectively transfer such duties and responsibilities. Not only is the same contemplated in the Aeronautics Act, but in Chapter P-34, R.S.C. 1970, an act entitled the Public Service Rearrangement and Transfer of Duties Act, wherein provision is made to empower the Governor in Council to 'transfer any powers, duties or functions or the control or supervision of any part of the public service of Canada from one Minister of the Crown to any other Minister of the Crown' -- see section 2, Chapter P-34, R.S.C. 1970.

In the materials which you have provided me with it seems clear that while officials of the Department of Transport and the Department of National

Defence appear to have worked out an agreeable arrangement under which the Department of National Defence plays a certain role in search and rescue services, nothing therein suggests that the Minister of Transport has been relieved of the statutory responsibilities imposed upon him by the Aeronautics Act in the manner contemplated by the legislation referred to above. Indeed, the documentation would seem to confirm that while the executive arm of government has directed the Department of National Defence to perform the broadest possible role in search and rescue, such executive decision has not been reinforced by the Governor in Council in the manner contemplated by both the Aeronautics Act and the Public Service Rearrangement and Transfer of Duties Act mentioned herein.

I would suggest that we arrange a meeting to discuss what you mean by your reference to the 'possible ramifications' of Mr. Kennedy's comments. It might well be that the Minister is discharging his duties under the Aeronautics Act notwithstanding the fact that he is doing so through an interdepartmental administrative arrangement which provides for the cooperative efforts of two Government Departments to maximize the efficiency of search and rescue efforts in Canada. The difficulty from my point of view is that without more information, I cannot express an opinion as to whether the present procedures and practices of the respective Departments clearly demonstrate that the statutory responsibilities and duties are not being properly discharged by the respective Ministers. Indeed, I am not even certain that the Minister of Transport wishes to assign his duties re air search and rescue to the Minister of National Defence. Certainly, there is nothing from the materials which I have reviewed that he has legally done so."
(Emphasis added.)

In a document prepared by the Aeronautical Policy Planning Programming Development Branch, Transport Canada, Ottawa, in December 1979 the following is stated:

"The Minister of Transport has a very clear duty to demonstrate a supervisory role in the field of search and rescue where Civil Aeronautics is concerned."
(Emphasis added.)

Mr. John T. Richards, Chief of Aviation Safety Promotion of the Aviation Safety Bureau, was concerned that the failure to resolve the responsibility for search and rescue was having a serious effect on its success and expressed that concern in his memorandum dated February 22, 1980, as follows:

"Aviation Safety - Policy DPD SAR Proposal

Having been active for nearly a decade in DOT/DND liaison on survival and rescue matters, I feel obliged to comment on a number of aspects. While the

attached documents have examined in considerable detail the options, the disadvantages and advantages, and the statutory confusion surrounding the entire matter, unless the basic anomalies are corrected, the proposed CATA/SAR staff will find itself in much the same position as we are experiencing.

On the one hand, it is argued that the Minister of Transport should exercise greater responsibilities (authority), yet the proposal is to remove the SAR staff from a responsible (executive) agency within CATA. The fact remains that the Minister does not exercise the responsibilities inherent in the Aeronautics Act for the simple reason that, except for ANOs such as V, 12, there are few enforceable standards and regulations relating to survival and rescue.

The primary reason for our apparent inability to exercise even functional control of matters relating to survival and rescue is that there are virtually no standards which are the primary tools for regulatory enforcement. For example, it is widely known in the industry (and indeed, a matter of present negotiation between ASP and DNH&W), that no formal specifications exist for survival food, conspicuity items, etc. Consequently, the provisions in Schedule 2 of V, 12 could be satisfied with a bag of sugar with respect to food, for example. (Correspondence on our negotiations exist on file 5002-3-5.) We concede that it is questionable whether the Bureau should become involved in these activities to such an extent, but as agreed to by Mr. Skinner and myself, the work would proceed in the spirit of a 'holding' operation pending resolution of the matters discussed in these proposals. The inputs of ASP over the past several years have been justified by regarding our role as a catalyst, bringing the various uncoordinated agencies together.

The foregoing notwithstanding, we appear to be embarking in a direction which is not attacking the real problem, viz, the separation of authority and responsibility presently vested in two Departments. This violates a basic principle of management and unless rectified will continue to create major problems. Any undertaking as diverse as SAR must be conducted by a single agency. It is now 35 years after a war which created the precedents for military involvement in search and rescue. Valid though the decisions were at the time - to vest in the RCAF SAR responsibilities - the present circumstances provide no such justification. Today, there are strong compelling reasons for a major reorganization of this field, leading to the acceptance by the Minister of Transport of full statutory and operational responsibility for SAR. The fact that SAR operations are seen by the public as humanitarian make it particularly relevant to the Minister's responsibilities under the Aeronautics Act. Further, search and rescue could be made - for the first time - a profession. As well, it would make available aircraft for other non-military applications such as air ambulance and similar mercy missions. When one considers the essential homogeneity of air and marine SAR it is difficult to provide any rationale for the distinct differences now inherent in these systems. If one is flying an aircraft over the coast of Canada the pilot's decision to forced-land on water vs land activities a distinctly different set of processes among several organizations. With the advent of SARSAT this anomaly is going to become even more apparent.

The Bureau's involvement in survival and rescue is one of preventing aircraft accidents in the first place, and addressing the fact that survival is a safety-related activity. We have two avenues for achieving its goals: the Aviation Safety Deficiency Notification (ASDN) and safety promotion programs. The former relates to activities of Transport Canada with respect to safety deficiencies in Transport Canada systems, such as safety regulation and enforcement processes. The second refers to on-going ASP activities of informing and motivating pilots. The fact that the bulk of aircraft accidents stem from pilot decision-making means that more effort should be aimed at eliminating the knowledge and skill deficiencies which induce them. This means that Transport Canada should be reviewing initiatives such as introducing a 'remote area endorsement' to a pilot license as one way of achieving a minimum acceptable level of competence. These are regulatory matters which the new SAR units in TC would be charged with. As pointed out in our 'Letter' editorial, there is a widespread difference of opinion in TC as to the Minister's responsibilities extending beyond accident prevention. This conflict arose, for example, during the early discussions over Departmental funding of SARSAT in which it was held by some as a communications system for SAR, and hence a DND obligation.

From the foregoing it is apparent that the proposed replacement of the staff in DPD using the rationale that it will be a monitoring body, eliminating the claimed conflict-of-interest in placing it in DSL and DLI, is to deny the fact that the Minister can hardly exercise authority except through these two agencies. Monitoring for deficiencies in systems such as DAT, DSL and DLI is already the responsibility of the Bureau.

This memo does not address all the matters, but is partial support of my concerns.

The present political situation may well afford us the opportunity of preparing a total multi-model SAR proposal for a once-and-for-all tidy-up the disarray left by historical rather than rational evolution."
(Emphasis added.)

It was the view of the Administrator that the responsibility for search and rescue did not lie within Transport Canada and he expressed his reasons for arriving at that conclusion as follows:

". . . the ELT does nothing for the safety of an airplane itself. It has nothing to do with airworthiness or the operation of the airplane. It certainly is a safety feature as far as the survivors of an accident is concerned, there is no question about that, but I think this is a very important point to keep in mind because later on when we get into discussions about resources, the question of attempting to find resources when we were undergoing considerable difficulties and our primary interests were related to that of trying to improve airworthiness and the enforcement and so on, problems which we heard so much about, it was very difficult to find the resources for the detailed work. . . "

As a result of the failure to resolve, in a definitive way, the responsibility for search and rescue, there have been many difficulties with respect not only to ELTs, which I will shortly be discussing in more detail, but also to other aspects of search and rescue. The Department of National Defence during 1979 prepared some search and rescue special reports which identified 13 cases where inadequate survival equipment had been carried on board aircraft.

With a view to obtaining enforceable regulations, a dialogue ensued between Transport Canada and the Department of National Defence. Colonel Dardier explained the results:

> "Q You said you had a dialogue with DOT and that you have been sending them information. Do you have any evidence at all at the present time that any improvement is forthcoming?
>
> A Not to my knowledge, no.
>
> . . .
>
> The real problem, I think, in this area, is that a lot of effort goes in on the part of the CATA to ensuring the safety of people when they take off to the point when they land. If something happens in between, quite apart from the fact that something in the system has failed, as soon as the mishap occurs it would appear that nobody's responsible for these people any more. And until the point where we pick them up and they come back into the living world again there is a big gap in the definition of federal responsibility and who should be looking after these people. Really what I am talking about, obviously you cannot look after them in the bush, but there are certain actions which you can take and plans which you can make which cover this sort of thing, which I think should be looked at with a view to assisting survival in this type of situation. . . ."
> (Emphasis added.)

PART II

DEVELOPMENT OF ELT LEGISLATION

In the early '70s a twin-engine Beechcraft flying south from the Arctic in the winter time crashed in the remote areas of Northern Ontario. Mr. McLeish described the incident:

> ". . . This was a case in which there were some survivors. As a matter of fact the survivors survived because they cannibalized those who died, but there was a great hue and cry in Parliament and there was tremendous pressure brought upon the Ministers of the day to do something about this. And all these facts certainly have to be considered as to the pressures that were felt by the Task Force and by the senior administrators of the Departments involved.
>
> That led to a joint decision by Ministers I believe in mid 1973 when - no, sorry, it was October '73 - when all Ministers endorsed the report and recommendations of the ELT Task Force and the Air Administration was directed to draft an air navigational order to require that ELTs be carried. . . ."

The Task Force, to which Mr. McLeish referred, was originally requested by him when he was Director General of Civil Aeronautics by a memo dated December 23, 1971 in which he stated:

> ". . . a task force involving several departments should be authorized in order to <u>bring this complex question to a successful conclusion in a reasonable time of six to nine months</u>, otherwise if it remains fragmented it will be liable to longer delays and accompanying confusion."
> (Emphasis added.)

On January 27, 1972 the Minister of Transport, The Honourable Don Jamieson, wrote to The Honourable Donald S. Macdonald, Minister of National Defence, and stated:

> "<u>It is apparent to me, on the basis of the information to date, that the installation of Emergency Locator Transmitters in aircraft would undoubtedly assist your Department in its task of search and rescue of downed aircraft. Because of the resultant savings of both lives and money, I therefore propose to proceed with a regulation to make their installation compulsory in Canadian aircraft</u>.
>
> . . .

I would propose that a Task Force be formed as soon as possible from the Departments of National Defence, Communications, Industry, Trade and Commerce and Consumer Affairs, with the Ministry of Transport as the department with primary responsibility providing the chairman, to advise on and carry out an implementation program. I visualize issuing a regulation by January 1, 1973, to become effective by January 1, 1974. . . ."
(Emphasis added.)

On November 26, 1973 Mr. D. K. Lynch, Coordinator of ELT Activities, wrote to the Chief, Air Regulations and Standards, with respect to the implementation date of the proposed Air Navigation Order. In that letter he pointed out that the inter-departmental ELT Task Force formed pursuant to Mr. Jamieson's suggestion considered that the January 1, 1974 effective date could not be met and had recommended the date of July 1, 1974. Mr. Lynch also pointed out that the Airworthiness Department considered the July 1, 1974 effective date "totally unrealistic" and recommended that a three-year period for ELT compliance be permitted. Mr. McLeish replied as follows:

"This situation suggests that there was insufficient consultation within Civil Aeronautics if we are only now aware of CAE comments. The purpose of the task force was to ensure that all specialists were afforded an opportunity to comment. Now, I have to reopen the whole subject and possibly recall the task force, unless you have some other solution. <u>This is urgent and requires immediate attention</u>."
(Emphasis added.)

On December 17, 1973 the Defence Research Establishment Ottawa (DREO), a section of the Defence Research Board, reported to the Ministry of Transport on their evaluation of the batteries (LithiCells) for MOT/ELT applications. The Task Force had previously recommended certain performance characteristics of the emergency locator transmitter, which performance characteristics could only be satisfied by the use of a lithium battery. The Defence Research Establishment had been asked to evaluate the proposed batteries and concluded:

"However, <u>certain reservations still exist with regard to the safety element in LithiCell usage</u>. Leakage of sulphur dioxide from cells with poor seals can be a health hazard where sizeable quantities of LithiCells are stored in small non-ventilated areas. Although an explosion hazard in connection with short-circuiting cells was not encountered at DREO, <u>it is felt that additional testing of sealed multi-cell packages is necessary to resolve some remaining uncertainties.</u>

> Prior to acceptance for operational use in ELT applications, tighter specifications and better quality control will be required."
> (Emphasis added.)

Pursuant to this report, Mr. Kenneth D. J. Owen, on behalf of the Airworthiness Section, wrote to the Defence Research Board, recognizing the report's conclusion indicating that additional testing was necessary, and stated:

> "It is therefore suggested that further tests be conducted to evaluate the effects of high temperature on typical ELT packaging configurations. . . ."
> (Emphasis added.)

Notwithstanding Mr. Owen's suggestion that further tests be conducted, no such tests were carried out.

Within the same time frame, reservations about the safety of the lithium cells were received from Transport Canada from other sources:

Standard Aero Engine Limited:

> ". . . concern over the suitability of Lithium cells for this type of application."

Naval Ordnance Lab - February 1, 1974:

> ". . . we are not in a position to recommend them for aircraft use. We believe there are potentially unsafe conditions existing in currently available Lithium cells. . . ."
> (Emphasis added.)

The Alberta Aviation Council - March 22, 1974:

> ". . . If you are hoping for lithium batteries to be the solution then we hear such rumours that they are gassy, corrosive, explosive and only manufactured by one company in North America. . ."
> (Emphasis added.)

Dayton Aircraft Products, Inc. - March 22, 1974:

> ". . . There is a possibility that utilizing new lithium batteries the time period could be extended slightly, however, lithium batteries are new on the market and their performance and reliability is unproven up to this time."

Centrum Avionics Limited - April 9, 1974 to the Director General, Civil Aeronautics:

> ". . . I felt I should let you know my concern about the possible use of lithium batteries in these devices. . . ."

Centrum Avionics Limited - April 9, 1974 to Aero Electronics Development Co. Inc.:

> ". . . Mallory Battery Co. here in Canada feel <u>the reliability and latent instability of the lithium batteries at this stage leave a great deal to be desired. This not to mention the possible hazards which may develop, such as, explosion brought about by internal shorts</u> should the battery not be provided with relief from internal pressure by a type of release plug; even if allowed to vent through a pressure type vent plug, there is then the presence of sulphur dioxide, an obnoxious and potentially dangerous gas.
>
> . . .
>
> <u>Our Ministry of Transport personnel are apparently aware of the potential hazards of lithium batteries but must have been lulled into a false sense of security</u> by assurances given by the main manufacturers of these batteries, . . ."
> (Emphasis added.)

Mr. McLeish, DGCA, expressed the position of the Ministry of Transport in a letter of May 2, 1974 in reply to the concerns expressed by Centrum Avionics:

> "This will acknowledge receipt of your April 9, 1974, letter in which you express concern about the use of lithium batteries in emergency locator transmitters (ELTs). <u>While all technical advice to date indicates that lithium batteries in ELTs will not create a safety problem</u>, we will be monitoring the equipment on a routine basis. Should a safety problem arise, corrective action will be taken."
> (Emphasis added.)

Mr. David G. Merritt, a Civil Aviation Inspector and team leader of the DGCA ELT project, which I will be discussing later, commented as follows:

> "Q In any event, Mr. McLeish seems to feel that the advice that he had at that point did not indicate a safety problem.
>
> MR. MERRITT: I was not able to find any technical data in my files that would support that statement, other than sales literature from the manufacturer of the battery."

Despite the expressed concerns, the Department of Transport on July 27, 1974 promulgated the Air Navigation Order which made the carriage of an approved ELT mandatory. The specifications for an acceptable ELT were determined by the Department of Communications (DOC). Those specifications called for certain minimum cold temperature radiated power output requirements. To meet these requirements, the most readily available power source was the lithium sulphur dioxide battery which was the subject of the expressed concern. As a result of the issuance of the ANO, some 17,000 lithium sulphur dioxide ELTs were sold in Canada. At an average price of $250, this represented a $4¼ million expenditure for the general aviation community.

The 1974 ANO allowed for the carriage of two different types of ELTs over an initial two-year time table. At the end of this period only one type of ELT, the lithium version, would be allowed. One month before the 1976 deadline, time was extended for another year because manufacturers could not meet the demand.

LITHIUM BATTERY DEFICIENCIES

On December 16, 1974, Mr. Owen sent a request to the Department of Communications asking them to modify their ELT specifications to enable the carriage of non-lithium batteries.

Throughout 1974, 1975 and 1976, increasing concern developed over the corrosive and explosive potential of lithium powered ELTs and, in fact, one such ELT exploded in 1975. Finally in 1977, CATA issued an Airworthiness Directive (ADCF-77-11) requiring that all lithium batteries be removed from ELTs in Canadian aircraft.

On September 9, 1977 Mr. Pierre E. Arpin, Director General, Civil Aeronautics, wrote to Mr. Walter M. McLeish, Administrator, and stated:

> "We are faced with the situation whereby <u>we have required most aircraft operators to purchase ELT's with a lithium battery and have made a declaration through the Airworthiness Directive that they are hazardous</u>. We are of the opinion, as is our legal counsel Mr. Shields (LCA), that we are in a precarious position legally. Because of the incompatibility of the AD and the ANO I consider it necessary that the requirements of the ANO be cancelled as soon as possible."
> (Emphasis added.)

Mr. McLeish replied as follows:

> "I cannot agree to cancellation of ANO but suggest we amend it or provide blanket waiver to use non-lithium cells and lesser performance in cold weather."

Mr. McLeish's solution was adopted, and the Air Administration has continued to waive the ANO requirements from year to year.

PART III

SPECIAL SAR PROJECT

In 1977, in an attempt to solve the ELT problem, CATA authorized the formation of a special project on search and rescue activities and appointed Mr. Richard J. LeBlanc as Project Manager. His mandate was:

> "To solve the legal, regulatory, operational and technical problems associated with ELT's in full consideration of present and future domestic and international SAR requirements."
> (Emphasis added.)

Upon his appointment Mr. LeBlanc requested more manpower to help him address the problem, but such manpower was not provided. While being questioned by Mr. Ouellet, Mr. LeBlanc testified in part as follows:

"Q Now, Mr. Leblanc, you still have this mandate? You are still holding that position today?

A I am still in that position, yes.

Q Am I correct to say that to date you have not solved the legal, regulatory, operational, technical problems associated with ELTs?

A Yes, that is correct.

. . .

Q You were named three years ago in charge of search and rescue project.

A Yes.

Q For three years the problems that we discussed earlier, there is an ANO saying you have to carry ELT, that there is an airworthiness directive saying you have to take them out, that the Department of Communications is the one setting up the specifications and they haven't been changed and that DND is operating search and rescue and they want ELTs; those problems that existed at least three years ago, when you were named or before that, at least three years ago when you were named, all those problems still exist today, don't they?

A Yes, they do.

Q None of those problems have been resolved?

A No, they haven't.

. . .

Q You are the person in charge of search and rescue?

A No.

Q Well, search and rescue projects.

A Yes.

Q The project to solve the ELT problem.

A That's correct.

Q And you are saying that today what you do is answer letters from parliamentarians?

A And write masses of correspondence to ICSAR and Colonel Dardier and put further plans forth and try to get assistance from other departments on these plans.

. . .

Q But apart from that today you are saying that despite the fact that you hold this position basically what you do is answer replies on what progress --

A Well there is a lot of administrative work, yes.

Q But on the actual question of your mandate are you making any progress?

A My mandate probably became, approaching meaningless when that last request for personnel was --

Q That was three years ago, though, was it?

A About two years ago.

. . .

A . . . I must very carefully consider the type of reply that goes out to these offices. I am eternally optimistic.

Q You get these letters saying what is being done and you write letters saying, well we are working on it?

A I do not refuse to answer them. I have to put out an answer that does not have lies in it. I do put out -- it's a very difficult question to answer.

. . .

Q As far as actual work on ELTs is concerned, which is basically why you were named, you are not really devoting much active work to that?

A I would say that I am very ineffective."
(Emphasis added.)

The present situation is a source of frustration to the Department of National Defence. Colonel Dardier stated:

". . . I think you can realize the frustration which exists in Defence both at the headquarters' level and more particularly at the operators' level where these guys were performing a very difficult task, I think. And certainly the search and rescue technician's job is a relatively dangerous one. They cannot choose where they are parachuting, and when they get there they may find that somebody is dead. And hoisting and repelling from helicopters is not very safe either, it's something that you do when you have to and would prefer to avoid it. <u>And what I am really saying is that they are bitterly disappointed, I am frustrated. We would surely like to get somewhere very soon</u>. I can see no reason why we can't. We should have been able to about two years ago."
(Emphasis added.)

PART IV

PRESENT SITUATION

The outgassing of sulphur dioxide from lithium sulphur dioxide batteries and the resultant forming of sulphuric acid within the units have caused the majority of Canadian lithium battery ELTs to be corroded beyond economical repair. In May 1980 a two-man DGCA ELT project team was formed consisting of Mr. David G. Merritt and Mr. Maximiliaan Vermij. They represented another DOT attempt to solve the ELT problem. They reported to the Commission as follows:

> "(a) Between 1974-1980 there were 20,000-23,000 Type F and Type P ELTs sold in Canada for all purposes, of which at least 17,000 originally contained lithium batteries;
>
> (b) Only 50% of the total number of Canadian aircraft required by Air Navigation Order, Series II, No. 17 to carry ELTs actually carry them;
>
> (c) Approximately 70% of those ELTs actually carried on board Canadian aircraft are modified in compliance with airworthiness directive CF-78-1 (February 1, 1978), while the remaining 30% still contain lithium batteries;
>
> (d) Of the total number of Canadian ELTs retrofitted in accordance with airworthiness directive CF-78-1 (February 1, 1978), approximately 70% are unserviceable due to lithium battery induced corrosion and/or battery retrofit;
>
> (e) Of the total number of Canadian aircraft required to carry ELTs, presently only about 15% actually have serviceable units on board;"
> (Emphasis added.)

Messrs. Merritt and Vermij concluded that the present ELT legislation is unsatisfactory and that:

> "CATA as yet has not administerially addressed ELT problems in an effective manner."
> (Emphasis added.)

Mr. McLeish described what had transpired as a "snafu". He testified:

> "Don't you think it is a snafu? The fact that we start out in '73 to try and have emergency locator transmitters in every airplane in the country to assist in

saving lives and to cut down the cost of search and rescue, and some six years later what have we got? We have got 15% or something and I do not know what that is. I think it is shocking."
(Emphasis added.)

PROPOSED SOLUTIONS

Various witnesses have suggested alternative solutions.

Colonel Dardier stated:

"A The quickest way, we believed, of getting these things back into aircraft, of saving more people's lives, was a fairly drastic solution which entailed cancellation of the waiver and reinstatement of the ANO, perhaps not exactly along the previous lines but in a way in which it was functional, and this presupposed a publicity program so that the potential owners - there would be a lot of buyers of ELTs again - could be sufficiently warned in advance --

. . .

THE WITNESS: . . . we recommended at the time, that we stick with the alkaline battery, which has a slightly lower performance.

. . .

Q . . . Did Transport Canada act on your recommendations?

A From where I sit, there was no action and we were very concerned in the Department. There was correspondence, there was talking at my level and correspondence at the level of the DND Co-Chairman and to the DOT Civil Aviation and, subsequently, a letter from the DND to Transport, and Transport has appointed a Task Force to look into these specifications and modify them so that people can carry the ELTs again.

Q Well, what was your reaction to this?

A Well, without wishing to be rude, from where I sit, it appears to be a severe case of bureaucratic arthritis.

. . .

Q . . . You want to return to full carriage of ELTs as soon as possible and your SARSAT system is predicated on the assumption that all or almost all aircraft will be carrying ELTs.

A What we are really saying is that the more the better.

Q Now you have the responsibility for this search and rescue in which ELTs play an important part. But the actual authority for ELTs is outside your Department?

A That is correct.

Q The authority for ELTs rest with Transport Canada?

A Yes.

Q And the responsibility for working with them is with the Department of National Defence?

A That's correct.

Q Do yóu have any estimated data at the present time for the re-installation of ELTs?

A No sir.

Q Is the present situation, would you say, frustrating your search and rescue operation?

A Very much so."
(Emphasis added.)

The Merritt-Vermij project team recommended as follows:

"A ... Three actions really are what are required: amend the air regulations so that our Department can issue an ELT type approval, equipment approval if you want to call it that because at the present time --

Q As opposed to the Department of Communications?

A That is correct. The Department of Communications actually in 1977 bailed out. They amended RSS147(3) so that it no longer contains ELT operational performance standards. It contains only information relative to frequency spectrum management. So they effectively got themselves out of the loop.

We still use those standards as a basis, so we see legislation has to be brought in place along with ourselves, DOT to issue equipment approvals, the promulgation of ELT approval standards in the engineering and inspection manual, lowering the specification to be accepted, at the present time 75 milliwatts output for 50 hours at minus 20 degrees Centigrade.

. . .

MR. MERRITT: ... We anticipate that the requirement of carriage will be eliminated in April, will come back into force January 1st, 1982, and then in that interim period all ELT presently in use will have to go back to the manufacturer or an approved inspection facility or an examination for latent sulphuric acid corrosion, and for the retrofitting of batteries that will meet the revised performance specification."

Obviously the Merritt-Vermij solution accepts standards not as stringent as the original published standards. More particularly, the new standards would not require the ELT to operate in temperatures below minus 20 celsius. Mr. Vermij commented as follows on his recommendations:

"Q Clearly many, many people are flying in areas where those temperatures, that is those below minus 20 Celsius --

A For those people it would be advisable to have an ELT which works at 40 degrees below. But to make it mandatory for the whole ELT population in Canada is not really necessary."

PART V

CONCLUSIONS

The evidence established that emergency locator transmitters save both lives and money. As Colonel Dardier remarked "People are dying and suffering in the field and each year we carry out a number of searches for people who are not carrying ELTs". Yet only about 15% of Canadian aircraft are presently equipped with serviceable ELT units on board.

It is to be noted that the ELT problem relates more specifically to aircraft in the field of general aviation. Aircraft used by air carriers are generally equipped with sophisticated technological equipment including emergency locator transmitters. Furthermore, air carriers follow known air routes which greatly simplifies a search and rescue operation.

In my opinion, by reason of the provisions of the Aeronautics Act, the Minister of Transport has the overall responsibility for search and rescue in Canada relating to civil aircraft. It is his duty to enact regulations in the field of search and rescue, including regulations with respect to emergency locator transmitters and survival equipment.

The operational role of search and rescue can best be carried out by the Department of National Defence, which is the present practice. I was very impressed with the search and rescue services provided by the Department of National Defence. However, as Mr. Hobson has pointed out, the agreement between Transport Canada and the Department of National Defence with respect to the operational role in matters of search and rescue has not in fact relieved the Minister of Transport of the statutory responsibilities imposed upon by him by section 3 of the Aeronautics Act. Furthermore, the agreement with the Department of National Defence has not been fully implemented in the manner contemplated by both the Aeronautics Act and the Public Service Re-arrangement and Transfer of Duties Act, which is also mentioned in Mr. Hobson's letter.

In 1971 the then Director General sought to bring a resolution of the emergency locator transmitter problem to a successful conclusion in what he qualified as "a reasonable time of six to nine months". Ten years later with only 15% of Canadian aircraft carrying

serviceable ELTs, and with the SARSAT launch date only months away, the ELT problem at the time of the hearings was no closer to a solution. If anything, CATA, although forewarned, aggravated the situation by obliging owners to purchase lithium battery ELTs which were shortly afterwards determined to be hazardous.

The present situation of having an Air Navigation Order in place requiring the carriage of lithium battery ELTs, and at the same time an Airworthiness Directive directing their removal, is completely unsatisfactory. The decision to waive the Air Navigation Order requirement can hardly be said to be an effective response to this problem.

The project team created in 1977 has proven to be completely ineffective because the person assigned to the task was given no support. It was not until 1980 when the Merritt-Vermij project team addressed itself to the task that any progress from a planning point of view has been made. However, it was not made clear during the hearings whether serious consideration was being given to their very constructive suggestions.

Colonel Dardier, I think, correctly ascribed the reason why no action had been taken over these many years to "bureaucratic arthritis".

There was some evidence presented to the Commission in the latter days of its hearings that certain United States' manufacturers may have finally developed a battery that meets the specifications called for in the Air Navigation Order. If this is the case, then CATA should take immediate steps to make the carriage of appropriate ELTs mandatory within the shortest practicable period. If there is some question as to the adequacy or availability of the new United States battery, then a mandatory order should be enacted, providing for the carriage of an alkaline or other suitable non-lithium cell. While it is true that an ELT powered by an alkaline battery would not meet all the requirements of the present Air Navigation Order, I agree with Colonel Dardier that even a weaker ELT is better than no transmitter at all.

In my opinion there is no reason why this long-standing problem could not be immediately resolved, and the Merritt-Vermij report affords a basis for such an immediate resolution.

PART VI

RECOMMENDATIONS

1. The Department of Transport assume the overall responsibility for search and rescue.

2. The search and rescue operation be carried out by the Department of National Defence.

3. An agreement between Transport Canada and the Department of National Defence with respect to their respective roles in the field of search and rescue be formalized.

4. New legislation be enacted making mandatory a requirement that each civil aircraft be equipped with a serviceable emergency locator transmitter, and the Air Navigation Order promulgated on July 27, 1974 and the Airworthiness Directive (ADCF-77-11) be repealed.

5. The specifications for the emergency locator transmitter be determined by Transport Canada rather than by the Department of Communications.

Comment

As has been noted, evidence was submitted that a newly designed battery was being developed in the United States which may meet the requirements of the present Air Navigation Order with respect to emergency locator transmitters. An immediate study should be undertaken as to the feasibility of using such a battery as the one to be prescribed by the proposed new legislation. In the event that this battery is not satisfactory, the intent of the recommendation is to make mandatory the best available emergency locator transmitter even if such transmitter did not meet the requirements of the present Air Navigation Order.

6. Air Navigation Order, Series V, No. 12, called The Order Respecting the Carriage of Emergency Equipment and Radio Communications Systems in Sparsely Settled Areas, be reviewed and updated.

CHAPTER III

PERSONNEL

INTRODUCTION

As was pointed out in Volume 1 of this Report, there is often more than one contributing factor to an accident. However, in fatal accidents nationally the human factor is a contributing cause in approximately 87% of the accidents, the machine in 13% and the environment in 59%. In non-fatal accidents, the human factor is a contributing cause in approximately 92% of the accidents, the machine in 30% and the environment in 53%. For statistical purposes, the human factor referred to is an error attributed to pilot or crew, but the human factor may also be present when accidents are said to have been caused or contributed to by the machine or by the environment.

In addition to the flight crew, there are many others who play a vital role in the aviation safety system including aircraft maintenance engineers, design approval representatives (DARs), airworthiness inspection representatives (AIRs), air traffic controllers, air traffic control assistants, flight service specialists, dispatchers, emergency personnel, flight attendants, electronic technicians, civil aviation inspectors, ATC assistants, weather forecasters, instructors, approved companies, and indeed management.

There is little point in manufacturing failsafe aircraft and in establishing safe procedures and systems unless the people involved operate the aircraft properly, adhere to the regulations and fulfill the roles they are expected to play in the overall aviation safety system. An error on the part of anyone of them can cause an accident or fail to prevent an accident.

In earlier parts of this Report I have discussed many matters relating to aviation personnel, and many recommendations have been made which directly relate to those involved in the system. In the Personnel Phase of the hearings, however, particular attention was given to the licensing system, the training programs and procedures, and the particular roles attributed to each of the personnel groups.

The Department of Transport is responsible for the licensing of civil aviation personnel. There are more than 65,000 licensed personnel in civil aviation in Canada including pilots, air traffic controllers, and aircraft maintenance engineers. In addition there are more than 25,000 student pilot permits in force. Others whose work has a direct impact on aviation safety are unlicensed.

It is perhaps in the Personnel aspect of civil aviation that the greatest improvement is necessary in order to enhance aviation safety.

PART I

LEGISLATION

Legislation applicable to personnel licensing includes the following:

The Aeronautics Act:

"6. (1) Subject to the approval of the Governor in Council, the Minister . . . may make regulations with respect to

(a) the licensing of pilots and other persons engaged in the navigation of aircraft, and the suspension and revocation of such licences;

(b) the registration, identification, inspection, certification and licensing of all aircraft;"

Air Regulations:

"104. The Minister may make orders or directions prescribing standards for the supervision and control of aeronautics and conditions under which aircraft registered pursuant to these Regulations may be operated and, without restricting the generality of the foregoing, may make orders or directions prescribing standards and conditions

(a) for the registration and identification of aircraft;

(b) for the certification and inspection of aircraft;

(c) for the physical and associated characteristics of, and the equipment used at, aerodromes;

(d) for the licensing of flight crews, air traffic control officers and aircraft maintenance personnel;

(e) governing the conduct of visual and instrument flights;

(f) for the establishment and operation of air traffic control, flight information and alerting services;

(g) that will ensure in similar operations throughout the world a level of safety above a prescribed minimum;

(h) that will ensure uniformity in the notification, investigation and reporting of aircraft accidents;

(i) for the dissemination of meteorological information for aircraft operations;

(j) for a dimensional system for all air navigation and air traffic control purposes;

(k) for the standardization of communications equipment and systems and of communications procedures used in air navigation; and

(l) for the collection, publication and dissemination of aeronautical information required for air navigation and aircraft operations.

403. The Minister may make orders or directions prescribing

(a) the various classes of licences and permits that may be issued under this Part;

(b) the duties and functions that may be carried out by the holder of a licence or permit of any class;

(c) the category, class or type of aircraft and the types of aircraft operations in which the privileges attaching to licences or permits of flight crew members may be exercised;

(d) the qualifications as to age, physical conditions, knowledge, experience and skill of persons to whom licences or permits may be issued under this Part;

(e) the nature of the examinations or tests to be undergone and information to be submittd by any person applying to have a licence or permit issued, renewed or validated or to have the conditions or privileges of a licence or permit varied; and

(f) such other conditions and limitations as the Minister deems advisable affecting the privileges attaching to licences or permits issued under this Part.

404. The Minister may, upon being satisfied as to the qualifications of any applicant,

(a) issue to the applicant a licence or permit appropriate to his qualifications, in a form prescribed by the Minister;

(b) issue to the applicant a document, in a form prescribed by the Minister, validating in Canada any licence appropriate to the qualifications of the applicant, held by the applicant under the laws of a contracting state or a country that is a party to an agreement entered into with Canada relating to interstate flying; or

(c) enter on any licence or permit held by the applicant an endorsement extending to the applicant the privilege of performing additional duties or functions appropriate to his qualifications."

(Emphasis added.)

DELEGATION OF PERSONNEL LICENSING AUTHORITY

The authority to issue licences has been delegated by the Minister of Transport by virtue of a delegation document and is primarily exercised by regional civil aviation safety inspectors.

The Aircraft Operations Group submitted the following list of those in the industry who have been given personnel licensing authority by CATA:

"1. **Designated Flight Test Examiner (DFTE)** means the holder of a commercial or higher pilot licence with an instructor's rating who is authorized by a regional controller civil aviation to perform flight tests for the issue of one or more of the following: private pilot licence, commercial pilot licence and multi-engine rating a DFTE is sometimes authorized to endorse a permit or licence for these additional privileges for a period of 60 days.

2. **Civil Aviation Medical Examiner (CAME)** means a physician licenced to practice in his resident province who is authorized to perform medicals for the issue and renewal of personnel licences and is further authorized to revalidate these licences for a period of 60 days.

3. **Company Check Pilot (CCP)** is the holder of a commercial or higher pilot licence who is authorized by LIO to conduct pilot proficiency checks, pilot line checks and/or instrument ratings on the pilots employed within his own organization. Some CCPs can also act as Air Carrier Designated Examiners (ACDEs) which authorizes them to conduct initial and recurrent PPCs and to upgrade first officers to captains.

4. **Authorized persons (personnel licensing)** means persons appointed by the regional licensing authority to conduct administrative licensing functions and to authorize licence privileges on a student permit for 60 days. These persons are often secretaries of flying clubs.

5. **Approved Maintenance Organization** means an approved inspection organization that has been set up to the satisfaction of the Chief Aeronautical Engineer by a firm or individual to assume responsibility for the airworthiness of an aeronautical product or for work done on

such a product. This responsibility will be assumed by virtue of the certifications given by the members or the organization on behalf of its chief, who, rather than a firm, will assume the final responsibility.

6. **Authorized representative of a company** approved to certify maintenance: refer E&I Manual, Part 1, Chap 11, Subsection 2.2.15(b).

7. **Authorized person:** means a representative of a company or any other person who is authorized under the E & I Manual to certify that the aircraft is airworthy or released for return to service."

Licences

Detailed requirements for the issue of personnel licences are outlined in the Personnel Licensing Handbook; Volume 1 contains the requirements for Flight Crew Licences; Volume 2 for Air Traffic Controller Licences and Aircraft Maintenance Engineer Licences; and Volume 3 details the medical requirements.

Certain rights and privileges which may be attached to licences are contained in the ANOs. For example, privileges that are attached to pilot licences are outlined in ANO IV, No. 2 whereas the privileges attached to the aircraft maintenance engineer licences are to be found in ANO IV, No. 6.

Air Navigation Order Series IV, No. 1 details the classes of personnel licences:

"1. This Order may be cited as the Personnel Licences Order.

2. (1) The following classes of licences and permits may be issued in respect of the duties and functions that may be discharged by a flight crew member of an aircraft:

(a) student free balloon pilot permit;

(b) student glider pilot permit;

(c) student gyroplane pilot permit;

(d) student pilot permit;

(e) free balloon pilot licence;

(f) glider pilot licence;

(g) gyroplane pilot licence;

(h) private pilot permit (tourist);

(i) private pilot licence;

(j) flight engineer licence;

(k) commercial pilot licence;

(l) senior commercial pilot licence;

(m) flight navigator licence; and

(n) airline transport pilot licence.

(2) The following classes of licences may be issued in respect of the duties and functions to be discharged by persons other than flight crew members of an aircraft:

(a) aircraft maintenance engineer licence; and

(b) air traffic controller licence.

3. No person shall act as

(a) pilot, flight navigator or flight engineer of an aircraft;

(b) aircraft maintenance engineer; or

(c) air traffic controller

unless

(d) he holds a valid and subsisting licence or permit issued under Part IV of the Air Regulations authorizing him to discharge that function, and he complies with

(i) the privileges of that licence or permit as set forth in any applicable Air Navigation Order made under the Air Regulations, and

(ii) any restrictions endorsed on his licence or permit."

Certain other legislation applies to unlicensed personnel. For example, the Air Navigation Orders for air carriers make reference to flight attendants:

"Cabin Attendant Training

50. (1) The initial training provided by an air carrier for a crew member before he serves as a cabin attendant required under section 40 shall include instruction relating to

(a) the authority of the pilot-in-command;

(b) the handling of passengers, including procedures to be followed in the event of the presence of persons whose conduct might jeopardize the safety of other passengers; and

(c) for each type of aeroplane on which he is to serve,

(i) a general description of the aeroplane,

(ii) in the event of an emergency, in so far as the awareness of such is necessary to fulfill his own individual duties, the duties, functions and responsibilities of other crew members,

(iii) the means of communication with the flight deck, and briefing of passengers,

(iv) the use of the public address system,

(v) the location and use of emergency and life saving equipment required to be carried, such as life jackets, life rafts, portable fire extinguishers, oxygen equipment, first aid kits and survival radio equipment,

(vi) the proper use of cabin installed systems controls, such as cabin heat, ventilation and galley, and

(vii) the physiological effects of lack of oxygen when aeroplanes are operated above 10,000 feet above sea level and, in the case of pressurized aeroplanes, physiological phenomena accompanying a loss of pressurization.

(2) Notwithstanding subsection (1), the training provided by an air carrier shall ensure that a cabin attendant is competent to perform the duties and functions assigned to him in the interests of the safety of passengers."

COMMENT

The enabling legislation as it refers to personnel licensing makes no reference to the Personnel Licensing Handbook. This is the document used by civil aviation inspectors

as the basic reference for all matters concerning the issuance of personnel licences. The Aircraft Operations Group, while referring to the ICAO Convention, made the following comments:

> "Canada, having signed the Convention seemingly is bound to uphold the Personnel Licensing Standards; however all Personnel Licensing Standards and some of the privileges of the holders are listed in the Personnel Licensing Handbook (volume 1, 2 and 3) which is not identified either in the Air Regulations or the Air Navigation Orders. Hence the handbooks have no legal authority. Furthermore other standards such as those for the Class IV Flight Instructor Rating implemented by Transport Canada during the 1974-75 period have no foundation in the Personnel Licensing Handbook."
> (Emphasis added.)

The Commission received countless submissions in all phases of the Inquiry that support the need to rewrite much of the legislation governing aviation. The Personnel Phase is no exception. The Aircraft Operations Group submitted:

> "Indeed there is no legislation similar to FAR 63 specifying the standards, procedures and course syllabi to be followed by flight training schools or clubs. The Personnel Licensing Handbook only includes very minimal requirements for approved private and commercial courses (Vol. 1, Appendix A to Chapter 3, pages 1-17 and 1-25). This major shortcoming is instrumental in letting some negligent instructors and schools graduate poorly trained pilots. Furthermore, effective enforcement is difficult against these operations as no effective legislative standards exist."
> (Emphasis added.)

In the final days of the hearings, counsel for the Air Administration stated that the Aeronautics Task Force under Mr. Robert S. Lafleur had addressed this problem and added that the draft was now completed giving legal status to the Personnel Licensing Handbook.

Not only is the legislation in many cases inadequate, but in other cases it is confusing as is illustrated by the following extract from ANO IV, No. 2:

> "**6.** (1) A licensee who is the holder of a Commercial Pilot Licence shall, before carrying passengers in an aircraft by night, have completed not less than five take-offs and landings by night in the same category and class of aircraft during the six months immediately preceding the flight.

(2) A licensee who is the holder of a Commercial Pilot Licence may

(a) exercise the privileges set out in section 5;

(b) act as pilot-in-command of any aeroplane engaged in a commercial air service if the aeroplane is of a class and type endorsed on his licence and has a maximum certificated take-off weight of 12,500 pounds or less;

(c) act as pilot-in-command of any aeroplane engaged in a commercial air service if the aeroplane is of a class and type endorsed on his licence and passengers are not carried for remuneration;

(d) act as pilot-in-command of any aircraft, other than an aeroplane engaged in a commercial air service if the aircraft is of a category and type endorsed on his licence;

(e) act as pilot-in-command or co-pilot of any aircraft if it is not engaged in a commercial air service and it is of a category, class and type endorsed on his licence;

(f) act as pilot-in-command or co-pilot of any aircraft if it is not engaged in a commercial air service and passengers are not carried;

(g) act as first co-pilot of any aircraft engaged in a commercial air service if it is of a category, class and type endorsed on his licence and has a maximum certificated take-off weight of 44,000 pounds or less; and

(h) act as second co-pilot of any aircraft engaged in a commercial air service if the aircraft is of a category and class endorsed on his licence."

It is obvious that the Aeronautics Task Force, when rewriting the legislation, will have to address the challenge of making the applicable legislation simpler to understand.

PART II

THE INTERNATIONAL CIVIL AVIATION ORGANIZATION'S LICENSING SYSTEM PROPOSAL

In 1979 the Air Navigation Commission of the International Civil Aviation Organization (ICAO) prepared a draft annex under the authority of the Air Navigation Bureau relating to a proposed licensing system. The following summarizes the new ICAO proposal.

"Introduction

There are two basic licensing systems:

- licenses expire at specified intervals and the State is responsible for their renewal by confirming the competency of the holder

- licences remain in force indefinitely and the holder is charged with maintaining his competency by self-discipline

Therefore we have combined these systems to ensure:

- proper training

- a common level of knowledge and proficiency

- competency is proved by examination

- periodic maintenance of competency is achieved

- proof of validity and competency.

Major Differences from present Annex 1

1. As opposed to the two tier system of the present Annex 1 a three tier system is proposed comprising:

- a licence, specifying the function of the holder (modified)

- a rating, describing the activity of the licence holder (modified)

- an endorsement, detailing the speciality for which the rating holder is qualified. (new)

2. The present Annex 1 defines 5700 kg AUW as a division between simple and complex aircraft, this has been dropped.

Differentiation has been introduced between flying an aircraft certificated for operation with one pilot and one certificated for operation with a minimum crew of two pilots. This appears as:

- a single-pilot rating and a command (pilot) rating for the appropriate pilot-in-command activity

- a second-in-command rating for the right-hand seat activity in those aircraft certificated for two pilots.

3. Training as such is not detailed in the present Annex 1. In the proposed draft, training requirements have been introduced and the interrelation of training, competency, examination and licensing emphasized. Requirements for maintenance of competency have also been introduced and transferred from Chapter 9 of Annex 6 to Annex 1.

4. To relieve the burden on States heavily involved in the periodic checking of personnel new concepts have been introduced calling for States to:

- designate approved persons to perform this task on behalf of the State (an extension of the arm of the State) when international recognition is required

- authorize approved persons to perform specific checks for domestic purposes

5. In updating the medical provisions there has been:

- reduction from four sets of medical standards to three

- extension of the interval between examinations

- deletion of upper age limits for flight crew.

<u>Conclusion</u>

Overall, the proposed system ensures that:

- the number of licences and ratings which have to be issued by the State is kept to a minimum

- provisions for training are properly determined

- maintenance of competency is assured

- direct involvement by State authorities is kept to a minimum

- adaptation by States into their current legislation will not create undue administrative difficulties

- States can be more readily assured of the competency of personnel thus ensuring recognition of foreign licences

- flight safety will be enhanced."

RESPONSES TO ICAO'S LICENSING PROPOSAL

After this proposal was tabled, the Air Administration sought comments from industry, headquarters and the regions and subsequently prepared the following summary:

"INDUSTRY COMMENTS

ATAC

The ICAO proposal does not appear to recognize or adequately accommodate either the Canadian geographical complexities or the broad diversification of operations. The proposal if implemented would limit the flexibility and effectiveness of the present Transport Canada licensing system, impose unnecessary penalties upon the aviation industry and add to the already burdensome Transport Canada workload. Strongly recommends that Transport Canada resist adoption of the proposed amendment and retain the flexibility and control of the present Canadian system.

CALPA

The terminology applied to the proposed licensing system would benefit from a review of the implications of each individual constituent of such system. The fundamental privileges of the holder of a licence should be governed, as they are now by the licence itself, rather than by a number of proposed expiry type ratings. Therefore, the proposal to incorporate command and aircraft type ratings within a single rating is opposed. A further structured approach was recommended. A major objection to the ICAO proposal was the requirement for the third flight crew member on multi-engine aircraft to hold a flight engineer licence, rather than a pilot licence. CALPA favours an Airline Transport Pilot Licence with a systems operator pilot rating in lieu of the flight engineer rating.

RCFCA

Though appreciating the theoretical benefits of the total changes envisaged and recommended in the ICAO document, it is recommended that the described system not be adopted in total at this time. Can there be justification for imposing a wholly new, eminently restrictive and costly system upon all Canadian pilots, the vast majority of whom will never benefit from the recommended new international standards? The impact of a sudden adoption of such a system upon cost to the licence holder, encouragement of new pilots into the industry and the long term effect on flight training schools could be dramatic.

CALDA

It is inconceivable that the ICAO proposal does not include Flight Operations Officers/flight dispatchers, the men on the ground who must ensure that all safety precautions and all government and company regulations are complied with. Opposed to any proposal which does not include Flight Operations Officers/flight dispatchers.

The Ninety-Nines

Do not want general aviation flying to become restricted as it is in many countries and want the retention of the North American uniqueness with respect to availability of flying and freedom of the skies. Strongly object to the use of the term Professional Pilot, recommend retention of the Senior Commercial Pilot Licence, and recommend deletion of medical rules prohibiting flying during pregnancy.

Air Canada

Commented only on AME licences. Considered the Canadian system to be more clear cut than the proposed ICAO system. Consider the Canadian system to give adequate recognition of the advanced state of aviation technology which appears to be missing in the proposed ICAO system.

Canadore College

Reviewed the ICAO proposal with respect to AME licensing and are satisfied with the minor changes made in this area.

Aircraft Electronics Association

Believe that avionics repair, overhaul, installation, etc, should only be completed in an approved shop, agree with the concept of an overall universally accepted program of certification, and would like a category for the installation technician or the avionic system designer.

SAMET

Believes that Canadian methods for the issue and control of the AME licence are, when compared with other countries, the most practical and should be adopted on the basic international standard. The addition of an avionics endorsement or licence should be considered.

COPA

Agreed with the increased flying experience for issue of a Private Pilot Licence and with the indication of more open-mindedness on the subject of medical assessment. However, COPA disapproved of the plan to drop the Commercial Pilot Licence in favour of a Professional Pilot Licence as there doesn't appear to be sufficient substance to be gained to warrant a change of this nature; recommended that the minimum requirements for the

commercial, senior commercial and airline transport pilot licences remain as they are at present as they are working well; and recommended that the present system of endorsements and ratings remain as at present as it appears to be working satisfactorily. COPA was adamant that in the event that Canada should adopt any of the proposed ICAO standards, there should be a grandfather clause which would allow holders of existing licences to exercise such privileges indefinitely without a requirement for requalification.

In addition, COPA provided a copy of IAOPA response to ICAO which they support and is summed up in the following extract from the IAOPA brief.

> 'IAOPA recognizes that the current edition of Annex 1 could be improved in order to have it better reflect existing conditions. However, we find no justification for the wholesale amendment proposed by the ICAO Secretariat. The drastic and radical proposals for changing the licensing standards of a majority of the licensed airmen of the world are unwarranted and unnecessary.
>
> IAOPA finds the draft amendment of Annex 1 unacceptable. Detailed comments follow.'

NORDAIR

Commented with respect to AME licensing only and found some proposals too restrictive and others acceptable.

TRANSPORT CANADA HEADQUARTERS AND REGIONAL COMMENTS

DLI

The many changes proposed would necessitate a complete revamping of the personnel licensing system, which would include numerous costly changes to the computer program, revision of licensing forms and licensing documents. It would also necessitate the re-issue of all existing licences and changes to existing training programs. Such major changes could not be made with the existing manpower. There are too many significant changes for a State, such as Canada, with a well established licensing system already in place.

DAT

Concern with the structure and concept for the ATC licence, but would like some flexibility in the time period for employing a rated controller at a new location.

SLFO

Proposal appears to be extremely complicated and involved. Agree with proposals to relate to minimum crew requirement rather than aircraft weight and recency requirement. Consider the use of Professional Pilot rather pretentious.

AFT

Brief editorial comments only.

ACA, Moncton

Endorse the ICAO structure and concept.

QCAE, Montreal

Brief comments on AME licensing changes.

QCA, Montreal

Brief comments on ICAO proposals.

OCA, Toronto

While the three-tier concept for licences makes sense and some of the changes would result in higher standards, the workload for conversion would be tremendous. Many of the changes could be incorporated in our present system with far less upheaval. Therefore, it is suggested that a more realistic course of action be devised.

CCA, Winnipeg

The present licensing and training system have some advantage in simplicity. The adoption of the proposed ICAO system should be broached with caution and reserve.

WCA, Edmonton

The proposed ICAO licensing structure would conflict with that which has evolved, through need, in Canada and is therefore rejected. The need for maintaining currency in areas of licence privileges has some merit but implementation and actually determining such currency by the means supported presents problems of nightmarish dimensions.

CATA Women's Advisory Committee

Consider that the ICAO proposal with respect to pregnant female pilots to be medically sound and appropriately worded."

On May 13, 1980, Mr. Barry D. Blair, Deputy Director General of Civil Aeronautics, sent the following memorandum to the Administrator:

"Reply to ICAO State Letter AN 12/1.1 - 79/156
Amendment to Annex 1, Personnel Licensing

ICAO have submitted for comments a proposal which would dramatically alter the licensing concept and structure in Canada and throughout the world. The proposal was forwarded to industry and Departmental personnel for comments. All replies are on file and a summary of the responses (flagged) sets forth major comments with respect to the overall concept, but does not include many of the more detailed replies to specific items.

Briefly, there is almost total rejection of the major structural changes proposed by ICAO because of the lack of flexibility, the possible adverse effects on the industry, the cost of such changes, and the workload associated with the complete overhaul of our present system. While there were positive responses to some minor changes, it was generally felt that such changes could be incorporated with far less upheaval in our present system in accordance with the Annex 1. A summary prepared by SLLP/L and LICP/L of some of the significant changes and our comments relating to them is attached.

To ensure that there is no doubt as to our total disagreement with both the structure and the concept of the ICAO proposal, we have not provided detailed responses to various parts of the proposed Standards, in that such comments might be construed as referring only to the parts needing amendment. We feel that a more general reply will more strongly reflect our total disagreement of the proposal and support our recommendation to complete amendments within the existing licensing concept and structure."
(Emphasis added.)

The next day, Mr. R. P. St. John, the Deputy Administrator, wrote the following letter to Mr. S. T. Grant, the Canadian representative on the council of ICAO:

"Reference your transmittal slip dated November 23, 1979, with which was enclosed State Letter AN 12/1.1 - 79/156 concerning Amendment to Annex 1, Personnel Licensing.

In response to the request by the Secretary General of November 29, 1979, the following comments are provided with regard to the proposed draft amendment to Annex 1.

The significant restructuring of the long and well established licensing system of Annex 1, Sixth Edition, is not acceptable to Canada. It is considered that the changes, as proposed, would only lead to more divergence from the present licensing system and an increase in the number of differences notified by Contracting States, and Canada in particular.

The purpose of the draft amendment, as set out in paragraph 2 of the State Letter, does not add any new concepts to the intent of the present Annex, but rather reduces the status of the Annex through removal of standards with respect to the Senior Commercial Pilot Licence, the Flight Operations Officer and the Pilot Licences for gliders, balloons and gyroplanes. It is recognized that maintenance of competency and valid documentation as proof thereof to other authorities may be improved upon in the present Annex but not to the extent of restructuring as proposed. In this regard, the Canadian method of entering a 'valid to' date with respect to instrument flight privileges on the licence itself is proof that the holder has been re-examined within the preceding 13 months in an aircraft of a type endorsed on the licence.

Having established that little or no change in the purpose of the Annex has been introduced, it is necessary to address the aim of the proposal as stated in paragraph 7 of the State Letter which suggests minimizing the need for changes in States' current regulations and practices.

Such a statement appears completely out of context with the restructuring proposal which, in fact, would require a total and comprehensive change in Canadian regulations and practices as well as to other Contracting States whose established licensing systems are based on the present Annex.

<u>In essence, the restructuring of the licensing system as proposed is totally unacceptable</u>.

Having addressed the licensing structure, it is necessary to comment as well upon the medical standards. These standards, with some changes, could be accepted were it not for the medical classes assigned to the Flight Navigator, Flight Engineer and Air Traffic Controller Licences and the change in frequency of medical examinations for these licences.

In view of the foregoing, it is recommended that a Personnel Licensing and Training Divisional Meeting be convened to review and update the present Annex.

Kindly forward our comments to the Secretary General in response to his letter of November 29, 1979."
(Emphasis added.)

COMMENT

In light of the universal criticism of ICAO's proposed new licensing system, and of the valid objections made by the Air Administration, I agree with the course taken by the Administration in proposing that it presently be rejected for use in Canada. Apart from the other valid objections, the expense of such a new licensing system would far outweigh any of its advantages.

PART III

FLIGHT TRAINING AND LICENSING

INTRODUCTION

In order to fly an aircraft in Canada, it is necessary to obtain a pilot's licence from the Department of Transport. There are basically two types of pilot's licences:

1. A private pilot's licence;

2. A commercial pilot's licence.

Onto each of these there can be engrafted additional restrictions or privileges reflecting additional training or the lack thereof. These restrictions and privileges are entitled "ratings and endorsements".

The training required by a pilot can be obtained from:

1. A licensed flying school offering a DOT approved course;

2. A licensed flying school offering a standard course (also called the "unapproved" course);

3. A licensed instructor operating on his own (free-lance instructor).

Each of these matters will be examined in greater detail below.

FLYING CLUBS AND SCHOOLS

Flight training in Canada is provided mainly through some 301 licensed flying clubs and schools varying from one aircraft and one instructor operation to schools such as Toronto Airways with 35 aircraft and a staff of over 30 instructors. The operator of a flying school or club must obtain a licence from the Air Transport Committee of the

Canadian Transport Commission, which deals with the question of public convenience and necessity. In order to operate pursuant to the licence, an operating certificate must also be obtained from the Licensing and Inspection Branch of the Air Administration. These certificates are issued to flying clubs and schools as Class A, B, C or D licences depending on the nature of the facilities, equipment, personnel and type of training offered.

Licensed flight schools offer either the DOT approved course or the standard course which is also known as the unapproved course. The recipient of a private pilot licence under either the standard or the approved course has the same privileges, namely, those found in Air Navigation Order, Series IV, No. 2. However, the flight experience required for the standard course is not less than 45 hours while for the approved course it is 35 hours. Both courses require the same level of theoretical knowledge tested by the same written examinations and the same skill level measured in a flight test. In return for the lower flight experience requirement, the student in the approved course for private pilot training must complete all requirements for the issue of a private pilot licence within a 12-month period from the date of enrolment. The pilot must have a certified log book which is not required in the standard course. The flying club or school receives authority to conduct an approved course after meeting certain standards including: holding an Air Transport Committee licence and a DOT operating certificate, being a member of an approved association and providing special facilities, such as a classroom and maintenance workshops. The approved school must give a minimum of 20 hours of ground school lectures which are also not required in the standard course. Approval also requires specific personnel in the school, namely, a chief flying instructor holding a Class 1 or a Class 2 instructor rating. The Personnel Licensing Handbook, Volume 1, sets out the remainder of the requirements.

Some years ago when the approved course was introduced, the reduction in required flight experience was an incentive for the student. More recently, as the aviation environment has become more complex, the student has required more instruction to reach a satisfactory level of skill. At present, the average student requires more than 50 hours of flight instruction to obtain the private pilot licence. Therefore, the distinction between the standard course and the approved course has become somewhat blurred.

Standards for Flying Schools

Considerable evidence was led during the hearings regarding the lack of standards for flying schools in Canada. There was a draft ANO entitled "Standards and Procedures for Air Carriers Operating Flight Training Schools" prepared in 1971. There has been no action to implement this draft, or any modification of it during the past ten years. One reason given for this lack of action was the objection to the ANO by the Air Transport Association of Canada which was expressed in their letter of December 7, 1971 signed by Mr. A. C. Morrison to the Director General, Civil Aeronautics:

> "Reference your letter dated November 19th, we would advise you that we have reluctantly forwarded copies of the proposed ANO entitled 'Standards and Procedures for Flying Training Schools' to our members for review and comment. We must however advise you, as a matter of urgency, that in our opinion, this proposed ANO, in its present form, is unacceptable and in view of the current excessive flying operations being conducted by unlicensed and uncertificated operators, introduction of the ANO with application to licensed training organizations only is, to say the least, unfortunate.
>
> The proposed ANO details minimum standards for training facilities, personnel qualifications, aircraft and equipment which, it must be assumed, the Ministry considers necessary to perform adequate flying training. If this assumption is true, then it must also follow that anything less than the stipulated standards must be unacceptable to the Ministry. It is noted however the ANO applies to air carriers certificated under Part VII of the Air Regulations only and is not applicable to those many operators who are not licensed or certificated but who are offering flying training to the public. As discussed previously, this proposed Order cannot be considered to be in the best interests of either the public or the licensed operators unless its application is extended to cover all flying training conducted for hire and reward or such training by unlicensed and uncertificated operators is effectively eliminated.
>
> We would welcome the opportunity to discuss this matter with you at your earliest opportunity."
> (Emphasis added.)

Mr. Jean D. Wagner, Regional Superintendent of Air Regulations for the Quebec Region, testified that there was still, in his opinion, a great need for this Air Navigation Order. He quoted from the letter dated July 18, 1979 of Inspector C. E. Fortin to Mr. Laurent Chartier, the Regional Controller, Civil Aviation:

"I have read and re-read the proposed order and the order in my opinion does not bring any major changes to procedures actually established in our flying schools. The order on the contrary will ratify an existing situation. But such an Air Navigation Order would be a great help for air regulation inspectors because the order would define in black and white the norms and procedures that must exist in our pilots schools.

If one studies Mr. Morrison's letter more closely, it does not appear that the Class 7 licence holders have serious objections to the publication and application of this order on condition that it is applied and would be applicable to all flight instruction given for remuneration.

To eliminate poaching in flight instruction it would be sufficient to apply Article 700 of the Air Regulations which reads 'No person shall operate a commercial air service in Canada unless he holds a valid and subsisting certificate issued by the Minister . . . etc. . . '

In my opinion flight instruction against remuneration is an operation of a commercial air service in Canada and I cannot understand why we seemed to have agreed not to apply this section to certain organizations and individuals who give flight instructions without a permit.

The publication of an order establishing aims and procedures in pilot schools would be welcomed by those departmental employees responsible for these services and for his part, Mr. Devost indicated his favour towards this concept. It is possible that the proposed order of which I enclose a copy should be amended insofar as it was prepared in 1971; flight instruction without doubt has evolved since then and this work would be up to headquarters.

The publication of an order regulating pilot instruction would establish prerequisites that would in no way affect responsible pilot school operators already doing business, but which would eliminate fly by night organizations which have neither the infrastructure, the personnel nor the equipment to give adequate training.

By putting order back into training one could hope for the following results:

a) The prosperity of our good schools.

B) The teaching personnel could establish a career in this field, being assured of a stable employment and an adequate salary.

d) A decrease in the amount of schools and an increase in the teaching and service to students.

e) A reduction in the number of infractions insofar as the students would be trained to respect the Air Regulations.

f) A more efficient surveillance by schools of their students and their pilots, which could lead us to hope for a lessening in the number of accidents."

(+)

(Emphasis added.)

Mr. Wagner was asked about the variety of standards for flight training schools:

"Q What effect does the absence of standards as regards schools have on aviation safety?

A In fact it definitely has an effect because if you have a student pilot that went to a good school, that followed serious theoretical courses, not only to reply correctly to exam questions but to give him good general knowledge in piloting and the result will be a safer pilot than a pilot who did not follow the right courses or who learned just enough to pass the exam or again the pilot who wrote the exam ten times until he passed it, or who purchases the questions from someone else."

(+)

Mr. Donald A. Richardson, Supervisor of Flight Training Standards for the Pacific Region, commented in a similar vein:

"Q <u>Mr. Richardson, where do we find the standards set out for which the flying school must comply</u>?

A <u>I don't know of any document which sets out standards completely and clearly in any one case. We refer to -- primarily to four documents for these standards, that is to the operating certificate itself -- the Personnel Licensing Handbook. The Engineering and Inspection Manual, and the Inspection Instructions</u>.

Q <u>Does this cause any difficulties in enforcing regulations and standards</u>?

A <u>Well, it does; it causes considerable amount of difficulty because none of these documents covers the whole picture</u>; each one covers one aspect of flight training standards, such as the E and I Manual, for instance, is the one that sets out the requirement for maintenance system.

The operating certificate document sets out the requirements for equipment, facilities and personnel, but it's not explicit in these requirements, particularly in regard to personnel. It sets out the requirements for qualified flying instructors, but doesn't deal with the appointment of Chief Flying Instructor, or specify the responsibilities of Chief Flying Instructor.

Now, the Personnel Licensing Handbook sets out the qualifications for Chief Flying Instructor, but again, it does not specify his responsibilities.

. . .

Q One more question: I understand that you have some difficulty in enforcing compliance with the regulations with regard to the students' training period. Is it correct that only an AP authorized person actually has access to all of the records of a student training so that a DOT instructor may not know whether all the regulations have been complied with?

A This is true. The only time that all of the records concerning the training of the student and his having met the requirement -- all the requirements for licensing actually come together is when the AP checks the application and signs it and endorses the student permit for licence privileges, that application form then comes to the Regional Office, along with some documentation, but most of the documentation, the student's log book, school training records, anything of this sort then stays behind. The school keeps its records and whereas the student keeps his log book and we never again have an opportunity to bring all of these documents together at one time.

Q And are there any standards for the record keeping in the schools?

A No, there are none."
(Emphasis added.)

COMMENT

In my opinion, the establishment of flight training standards in Canada is urgently needed. The proposed ANO responded to many of the existing problems. Amongst other matters, the ANO sets out requirements for flight planning facilities, ground training facilities, aircraft maintenance facilities, and included instructor requirements for ground training instruction.

It is true as Mr. Morrison has pointed out that by imposing upon one group (licensed flight training schools) specific detailed requirements, while leaving a second group (free-lance instructors) free from such requirements, could place an unfair burden upon the licensed school and also expose some students to inferior training.

I recognize that free-lance training is in some cases necessary in a country the size of Canada. Many pilots obtain instructor ratings in order to acquire additional flight

experience needed to qualify for more lucrative employment and to obtain their airline transport rating. Others become flight instructors to earn the necessary funds to help support the cost of operating a private aircraft. In geographically isolated areas, many students have found it more convenient to obtain their instruction through a free-lance instructor rather than travelling to more populated centres to attend a flight training school.

However, the distinction between approved and unapproved courses should be removed. All licensed flight schools and all free-lance instructors should be required to follow the same course of instruction and to the same standards.

Flight training schools should be governed by legislation such as the proposed ANO, Series VII, No. 5, and there is an urgent need to complete any revisions necessary and to promulgate it as quickly as possible.

Free-lance instructors should be required to maintain course records in a manner established by the Air Administration, and these records should form part of a student pilot's application for a licence to ensure that appropriate and adequate training has in fact been carried out. Furthermore, any student who has received instruction from a free-lance instructor should receive his flight test from a DOT inspector.

With the abolition of the unapproved course a higher quality of instruction would be achieved including the requirement of a higher class of instructor, and a minimum of a Class II instructor would be necessary which would encourage flight instruction as a career and, in the long run, ensure competitive salaries for flight instructors.

This would also be in accord with the Harker-Paris-Pickard Study, to which reference will subsequently be made, when they stated:

> "In view of its capability of providing better training and because the MOT manpower resources required to monitor flight training conducted under an effective 'approved' course can be reduced, it is considered that approved course training should be encouraged. This belief was substantiated in both the U.K. and U.S.A. where it was conclusively demonstrated that the

approved course concept provided the necessary control to produce a predictable and uniform level of pilot competency which was unattainable under non-approved conditions."
(Emphasis added.)

Instructors

At present, a ground school instructor need not be licensed. Ground school instruction is the classroom study of such aviation matters as air regulations, aerodynamics, weather and so forth. Inspector Peggy Wilson, a flight training standards inspector in the Ontario Region, explained that private pilots can teach only what is necessary to pass the examination with no deep understanding of the subject. She would remedy this by requiring an instructor rating for ground school instruction. Mr. Paul A. Rivers, Personnel Licensing Officer in the Ontario Region, had a similar comment on flight training schools:

> "A ... duties are delegated based on seniority and at many flight training schools it's the newest man in that is usually asked to carry out ground school instruction. So, you have the situation where the person quite often with the least flying experience, the least teaching experience is asked to carry out ground school instruction for potential pilots or new student pilots. Now, maybe that's not desirable, but the other thing that follows hand in hand with this is that a newly licenced instructor, flight instructor is also assigned to teach pilots or people who can't fly, whereas, they become more experienced in flight instruction, they get higher instructor's ratings, they get higher qualifications, multi-engine endorsements, instrument ratings.
>
> The more senior instructors are asked to instruct people who can fly and they're asked to teach them how to fly better.
>
> Q So, it's basically the ab initio training which is perhaps the most important and crucial learning stage that is often taken by the least experienced instructor because it's considered to be least desirable?
>
> A Yes."

A number of individuals complained about those instructors who are simply logging hours to get a better job. On this lack of career instructors, Inspector Wilson said:

> "A The only way, of course, to make it a more attractive career is to pay them more, but the only suggestion I can make on that is to limit the number of instructors that we have thereby making it impossible for schools

to have the attitude that there is another young instructor waiting outside the door for your job if you don't want to work for that kind of money because that is the general attitude of a lot of schools.

Q How would you limit it?

A Making it more difficult to get an instructor's rating, designating particular schools, making it an actual teaching career where they need much more teaching background.

Q By making it require longer hours to become an instructor and much more training and study?

A That's right. And there would be fewer of them.

Q People will be less tempted to use that route to get the hours for an airline job?

A That's right."

Mr. Ross Smyth, a part-time flying instructor, submitted in his brief to the Commission:

> "The flight instructor is the key to training safe pilots. The constant turnover of instructors means that few recently trained private pilots have enjoyed the counsel of professional, seasoned flight instructors. Perhaps the most experienced instructors on staff should fly with beginning students, the opposite of common practise."

Although I will later be making recommendations which will, in my opinion, upgrade the status of instructors, it is worth noting at this point that as of July 1st, 1981, there were 41,198 private pilot licences in force in Canada, of which only 420 were instrument rated. One of the reasons for this low number of instrument ratings is because it is not mandatory for any flying instructor to have an instrument rating. An instructor in the top category, Class 1, (of whom there are 168 in Canada) requires 1,500 hours' experience in flight, but does not require an instrument rating.

COMMENT

In order for an instructor to teach instrument flying, he must hold a Class I instrument rating or an instrument instruction endorsement. But the endorsement is not an instrument rating. The endorsement simply certifies that the instructor has passed a

check ride with an inspector, the subject of which was not instrument flying, but rather teaching basic instrument flying. He must also have passed a written examination. However, the endorsement does not give permission to the instructor to fly in instrument meteorological conditions. There is no need for the instructor to have a current practical skill in order to teach the theory of instrument flying. We thus permit an instructor who has never flown in cloud to teach a student how to fly in cloud.

To remedy this obvious deficiency in the system, instructors teaching instrument flying should be required to have, or to have held within the last 24 months, an instrument rating.

Multi-Engine Training

In Volume 2, when I reported on Departmental Aircraft, I referred to the fatal crash of a Transport Canada Twin Otter on February 28, 1981. In that accident two Department of Transport's civil aviation inspectors died while practising single-engine emergency procedures during an instrument check flight. Such emergency procedures form part of multi-engine rating tests, instrument check rides and pilot proficiency checks.

It is well known that numerous accidents occur during multi-engine training in small aircraft. This problem has been reduced for large transport aircraft by the use of simulators for the most dangerous exercises.

The following extract from an accident report is illustrative:

> "The flight departed Saskatoon airport at 1734 on March 2, 1978. The pilot in the left seat was a candidate for an initial instrument rating while the senior Transport Canada inspector occupied the right seat.
>
> About 25 minutes after departure the flight returned, requested and was cleared for an ADF approach to runway 08. When crossing the beacon inbound a low approach and overshoot was requested. This was approved and about 2 minutes later the aircraft's left wing dropped rapidly and it entered a spin which continued until ground impact.
>
> Presumptive evidence indicated a simulated single engine go-around was being conducted. The manufacturer of this aircraft had issued a safety directive two years prior to the accident warning about the dangers of

attempting single engine flight at what had theretofore been considered a safe minimum speed - Vmca. The directive stated in part: 'The recommended safe one engine inoperative speed was selected to provide a margin above Vmca to ensure the availability of control and to further ensure that a possible resulting spin is not encountered unexpectedly when one engine is suddenly stopped.' This information was distributed by the manufacturer in the USA but not to all operators in Canada. There is no indication that either pilot was aware of this hazardous condition." (LP 79/78)
(Emphasis added.)

The following internal memorandum of March 24, 1980 is also pertinent. An inspector, in writing to express his concern about the inadequacy of a flight manual obtained from the Department's technical library prior to a test flight such as the aforementioned, observed:

"Inspectors scheduled for flight tests in aircraft with which they are not too familiar normally find it prudent to obtain a flight manual prior to the flight test in order to familiarize themselves with pertinent data of the aircraft concerned and to select relevant questions to be asked during the oral part of the flight test.

As I was scheduled to perform a flight test in a PA30 aircraft March 19, 1980, a.m., I followed the above cited practice and obtained the only copy of the PA30 Flight Manual available in the technical library. This copy consisted of only 8 pages dealing on limitations and procedures while the remaining pages consisted of 9 supplements, 5 of whom detailed various auto pilot installations. Furthermore, the last amendment to the manual was dated June 29, 1967.

During the conduct of the oral part of the flight test, the minimum control speed of the aircraft for single engine operation was found to be 90 M.P.H. instead of 80 M.P.H. as specified in the manual obtained from the technical library. The former data was confirmed as correct through perusal of the up-to-date flight manual which the candidate had in his personal possession. The discrepancy in the MOT Flight Manual is considered very serious considering that this aircraft stalls at 76 M.P.H. and has previously been involved in several fatal accidents during single engine operation. It should be noted also that instrument flight tests on twin engine aircraft normally involve simulated single engine operation. This instance has revealed what is felt to be a negligent and dangerous practice, that of allowing a flight manual stored in the technical library to become outdated. This instance also begs the question: How many more flight manuals are outdated?"
(Emphasis added.)

COMMENT

It is obvious that multi-engine training is a potential source of serious accidents and in fact, in the past, has resulted in accidents and/or incidents which could have been avoided.

Many believe that there are more accidents during simulated engine failures than during actual emergency engine failures.

It is therefore essential that aircraft flight manuals be current and contain correct information. In the above-mentioned cases, I am particularly disturbed that an inspector who has the responsibility of maintaining the standards is not supplied with the documentation that the pilot who is being tested by that inspector is expected to possess. Furthermore, inspectors should have current flight experience on aircraft with respect to which they are engaged in the course of their duties.

THE PRIVATE PILOT

Many witnesses testified during the course of the hearings as to the inadequacy of the present curriculum offered to student pilots. Mr. Andre Paulin, the Regional Quebec ASI's Superintendent, in his brief stated:

> "To obtain a pilot licence, no instrument hours or night hours are required. Yet many accidents are caused by this lack of ability as well as a lack of navigational knowledge. There are many accidents which exemplify this statement."
> (+)
> (Emphasis added.)

Mr. Paulin concluded:

> "We should include a minimum of five hours of night flying and five hours of instrument flying in the requirements for a private pilot licence. Furthermore it would be preferable to add as follows to the ground school instruction for student pilots:

a) <u>better weather training</u>;

b) <u>better pre-flight plan planning, navigation, and fuel management</u>;

c) <u>include a minimum of two hours on aviation safety, carried out preferably by the regional advisor on aviation safety</u>;"

(+)
(Emphasis added.)

Mr. Pierre Rivest, to whom I have previously referred, who has had considerable experience in pilot training and who is the author of a number of books on the subject, presented a brief which stressed quality control and pilot training. He stated as follows:

> "<u>Pilot training in Canada has over the last three decades had its high and low points but presently is following a descending curve</u>. The principle causes are the following:
>
> a) following the second world war, instructors were available from the field of military aviation but they have gradually been absorbed by commercial air carriers or have simply left the field; for example in the 50's, 95% of instructors who taught in our schools and flying clubs came from the military field whereas today it is the opposite.
>
> b) there is not enough adaptation considering the many changes taking place in civil aviation. <u>The recognized courses for obtaining a private pilot's licence as well as a professional pilot's licence have changed very little in the last 35 years</u>.
>
> c) <u>as regards the training and specialization of pilots we have presented little that can be considered serious: no real course to train instructors, no courses on subjects as important as multi-engine flights, hydroplane, instrument flights; no requirements for ski planes (and yet Canada is the most important country in the world in this field)</u> . . .
>
> d) worse, no minimum educational level requirement for the commercial pilot, senior commercial pilot, or air transport pilot! This situation is abnormal if we consider that no occupation and no profession is without minimum educational level requirements. How many accidents have been caused because the pilot could not understand and analyze the situation?
>
> e) <u>furthermore no pilot instructor's licence is required to teach instrument flight, multi-engine flight, floatplane flight, etc. Yet, the techniques that must be taught for each of these different forms of flight vary considerably and should be the object of specialized courses given by instructors trained in this field. There is no licence for ground instructors</u>.

f) too many pilot schools: the numbers are there but not the quality. A school permit should be issued not only on the basis of the number of potential students or the number or the cost of aircraft rentals but on the quality of the instructors and of the academic material;

g) there is too much delegation of control given to flight schools: flight tests and written examinations are carried out by persons who are in such a position of conflict of interest that the situation is ridiculous."

(+)
(Emphasis added.)

COMMENT

General aviation accounts for approximately 50% of accidents while representing only approximately 25% of flying time. As will be observed in more detail in a later portion of this Volume devoted to weather, many of such accidents are attributed to weather. Pilots become disoriented when either inadvertently or deliberately they enter clouds. They also become disoriented while in flight for other reasons. The minimum private pilot's curriculum does not require any training for instrument flying. Many accidents could have been prevented if pilots had even a limited amount of such instruction. It is axiomatic that one of the best ways to make flying safer is through better training.

At the present time to obtain a private pilot's licence through an approved course, the student pilot must receive a minimum of 35 hours' training. I am of the opinion that this should be increased to 45 hours minimum training of which at least five hours should be devoted to instrument training. The purpose of this instrument training would simply be to prevent disorientation for the pilot in case of inadvertent cloud entry or low visibility.

It would be preferable for all private pilots to receive their instruction at a licensed flight training school. However, it is apparent that such a requirement would, in some cases, be impractical. I have therefore proposed that the distinction between an unapproved course and an approved course should be abolished, and all flight training should be based upon the same course of instruction, the curriculum for which should be set by the Air Administration.

The above proposals, if enacted, would immeasurably improve pilot training and, in the long run, strengthen the aviation safety system.

LICENSING REQUIREMENTS

Pilot licences are issued in levels based on increasing qualifications. For a person with no prior flying experience, one of the first steps in obtaining a pilot license is a medical examination by a designated medical examiner. The medical report is processed by the Air Administration and if the requirements are met, the student receives a Student Pilot Permit. The permit is not a requirement for training flights with an instructor (dual instruction) since the instructor is considered to be the pilot-in-command of the airplane. The permit is required for training flights when the student practises solo. The student must have a basic understanding of flying rules before flying solo and therefore must pass a written test on air traffic procedures before the first solo flight. The Student Pilot Permit restricts privileges to daytime Visual Flight Rules (VFR) without passengers, within Canada, and only while under the supervision of a flight instructor.

For a student pilot to obtain a Private Pilot licence, the following requirements must be met:

(1) The applicant shall have reached his seventeenth birthday;

(2) A satisfactory report of a medical examination must be submitted, and an electrocardiogram is required if the applicant is of 40 years of age or over;

(3) The applicant must obtain not less than 60% in a written examination;

(4) The applicant must have completed not less than 45 hours flight time, or 35 hours if the applicant has completed the Department of Transport approved course;

(5) The applicant shall have successfully passed a flight test conducted by a Civil Aviation Inspector or a Designated Flight Test Examiner.

The private pilot licence as well as other categories of licences can be endorsed to give the pilot additional privileges. A sample private pilot licence may be endorsed for aircraft in excess of 4,000 pounds, night privileges, instrument rating privileges, multi-engine, and seaplanes. As of October 1, 1979 there were 40,283 private pilot licences of which only 318 were endorsed for instrument rating privileges.

Written Examinations

At the present time, to obtain a private pilot's licence, the candidate must obtain 60% on a written examination. The written examination is in the form of multi-choice questions. In the brief presented by Mr. Didier Feminier on behalf of the Ecole de Pilotage, College d'Enseignement General et Professionnel de Chicoutimi, he was critical of the format of multi-choice questions and of the questions selected, as not being an approved test of the requisite skill.

One of the inherent frailties of the present written examination is that a candidate could achieve a 60% marking overall and yet be utterly lacking in knowledge of one of the important subject matters. For example, the written examination could disclose that the candidate had a complete absence of any knowledge of weather but, nevertheless, the candidate could pass.

Inspector Peggy Wilson, to whom reference has already been made, suggested a 90% requirement, along with changes in the examination itself from entirely multiple choice to a form of open book examination. When asked if she had seen unqualified people eventually pass the examinations, she said:

> "Yes. They will write the exam and sometimes they will go for more ground school and sometimes they don't, they will attempt the exam again. And over the years of teaching there are quite a few people that would constantly go in and re-write the exam and re-write the exam and it would end up four, five, six times until they would pass it."

She also suggested limiting to three the number of attempts at the actual flight test for private and commercial licences.

COMMENT ON WRITTEN EXAMINATIONS

Having regard to the evidence of those who had the greatest expertise on this subject, it does appear advisable that the format of the written examinations and the method of determining a pass mark should be reviewed. In my opinion certain subjects should be made mandatory, and the candidate should have to satisfy the examiner that he or she is

well versed in each of the mandatory subjects. It also appears advisable to set a limit on the number of times a candidate can repeat the test.

Aeromedical Training

With advanced technology, private pilots can now fly a single-engine aircraft at altitudes formerly reserved for larger aircraft and for more highly trained civilian and military personnel. Flying at such altitudes requires the use of oxygen or pressurized systems. At present, there is no requirement that pilots be taught the symptoms and affect of the lack of oxygen (hypoxia) as part of their initial training.

In its brief, the Canadian Society of Aviation Medicine emphasized the importance of training the pilot to know how his mind and body function in a hostile air environment. The Society made the following suggestions:

> "(a) Basic aeromedical training be included in the training syllabus for all pilots, and that basic knowledge in this area be included in the requirements for the issuance of an aircrew license. An Air Navigation Order entitled 'Flight Training Courses' (which included this requirement), was prepared in 1973 but never promulgated. . .
>
> (b) 'High Altitude Indoctrination: courses now provided for Canadian Forces Personnel should be made readily available to civilian pilots who fly at altitudes requiring the use of oxygen or pressurization systems. In the United States there are about 30 military bases where such training is available to any civilian pilot for a nominal fee. In Canada access to such training is severely restricted, even at facilities with civilian orientation, such as the Defence and Civil Institute of Environmental Medicine."
>
> (Emphasis added.)

The draft Air Navigation Order, previously referred to, was the subject of a July 9, 1973 letter from the then Minister of Transport, The Honourable Jean Marchand, to Mr. Jean-Jacques Blais, then member of Parliament for Nipissing, to whom Dr. D. A. Dellandrea, former President of the Canadian Society of Aviation Medicine, had expressed his concern as to the lack of instruction in aviation medicine:

"This is further to your letter of May 30, 1973, and the letter of May 25, 1973, from Dr. D. A. Dellandrea of North Bay, Ontario, concerning aeromedical training.

The need for incorporation of aeromedical training in the basic knowledge requirements for pilot licences has been recognized for some time. In this regard, an Air Navigation Order entitled 'Flight Training Courses', which is in the final stages of approval, will require instruction in 'Aeromedical Factors' on the same basis as the regulatory and technical subject material for a licence.

The date of promulgation of the air Navigation Order has not been set at this time: however, once the Order is promulgated, training organizations will be required to comply with the requirements thereof within a certain period.

I believe that the foregoing will enable you to inform Dr. Dellandrea that <u>my Ministry has taken steps to ensure aeromedical training is included in the basic knowledge requirements for the issue of a licence as stressed in his letter</u>."
(Emphasis added.)

The syllabus of approved ground training for a commercial pilot's licence in the United Kingdom includes the following:

"3 AEROMEDICAL TRAINING

A course of basic training in aviation medicine for aviators shall be included. It is expected that this will require a minimum of 6 hours of instruction by a Doctor qualified in aviation medicine."

COMMENT

The Air Navigation Order mentioned by the Minister of Transport in 1973 was never promulgated. Accordingly the need to strengthen basic training in aviation medicine still exists. Such training should now be given to all student pilots.

Under the leadership of Dr. Ian Hall Anderson, Director, Civil Aviation Medicine, Medical Services Branch, Health and Welfare Canada, the Department of Health and Welfare has made great strides in aviation medicine. His cooperation, which I know will be readily given, should be sought in outlining the course and the nature of the training in aviation medicine which should be given and in obtaining the sources available for such instruction.

THE COMMERCIAL PILOT

The leading distinction between the private pilot licence and upgraded licences is that the private pilot cannot fly for hire. In order to do so, the pilot must hold a commercial pilot licence, a senior commercial pilot licence or an airline transport pilot licence.

As with the private pilot licence, the student can train at an approved school or at a school that offers the standard unapproved course. Again, the principal differences between the courses are not in resulting privileges or skill level, but in required hours of flight and ground training. The standard course requires 200 hours flight time, while the approved course requires only 150 hours flight time, but a minimum of 20 hours of ground school. The approved school must provide a classroom, a chief flying instructor with a higher class of instructor rating, a minimum of two aircraft available for flight training and so on. The privileges of the commercial pilot licence can be extended through additional endorsements and ratings which include: the instrument rating, the instructor rating, multi-engine class rating, aircraft type endorsement, alternate land plane or seaplane endorsement. Additionally, a pilot of a fixed wing aircraft may obtain an alternate category rating for rotary winged aircraft and vice versa.

A licence higher than a commercial pilot licence must be obtained for the pilot to fly large aircraft (over 12,500 pounds). The senior commercial pilot licence, for example, which requires 900 hours total flight time, allows the holder to be the pilot-in-command of an aircraft of up to 44,000 pounds maximum certificated take-off weight. The airline transport pilot licence, which requires 1500 hours total flight time, allows the holder to fly as pilot-in-command of any airplane engaged in a commercial air service if the airplane is of a class and type endorsed on his licence and he holds a Class 1 instrument rating. In order to obtain either of these upgraded pilot licences, in addition to flight experience, the pilot must write advanced examinations in several subjects relevant to aviation, such as, meteorology, air regulations, navigation, and aircraft operation.

Mr. Didier Feminier, in his brief on behalf of the Ecole de Pilotage, College d'Enseignement General et Professionnel de Chicoutimi, stated:

"In the United Kingdom, a Candidate would not be admitted to a commercial pilot course unless he has a General Certificate of Education. Commercial pilot courses seeking an IFR rating last a minimum of 52 weeks, full time, excluding any vacation period. The minimum number of hours given to ground school instruction is between 550 and 600 hours (580 hours is recommended). The minimum flight experience is 230 hours. In Germany, student pilots following Lufthaansa's ab initio course are trained during 24 months full time. . . .

In Switzerland, l'Ecole Suisse d'Aviation de Transport (ESAT) gives a course that lasts 18 months full time.

In the USSR, a pilot's course last between 25 and 32 months full time. . . .

In Canada, the candidate for a commercial pilot's licence does not have to follow any course full time. If he choses an approved course, the flight experience required is 150 hours that the student can carry out any time on condition that he carries out the last 60 hours during the same year. The number of ground school courses required is 20 hours for a private pilot licence and 20 hours for a commercial pilot's licence, namely a total of 40 hours. There is no ground school requirements for a candidate following a non-approved course. The only academic pre-requisites are the following: 'The candidate must be able, without assistance, to read the examination questions and to write the replies either in English or in French.'

If we do not refer to our neighbours from the south, it is because the requirements in the United States as regards commercial pilot training are similar to the Canadian requirements."
(+)

Mr. Feminier also pointed out that an examination was only part of pilot training and that the most important aspect of all training was accumulated experience. In Mr. Feminier's opinion only a serious program combined with structured and regular courses could attain the objectives required in the name of aviation safety, namely, that pilot training give the student the basic tools which he would need to exercise his profession with the necessary competence; that the student be educated to develop a professional attitude towards flight; and that Canadian training requirements be brought closer to internationally recognized norms. He submitted that all instruction should conform to the approved curriculum, and consequently all schools should be upgraded to the approved course status.

COMMENT

For many of the same reasons outlined when I discussed obtaining the basic pilot licence, I am of the opinion that the unapproved course option for commercial pilots should be abolished.

Furthermore, in the case of commercial pilots, all flight instruction for the obtaining of a commercial pilot's licence should be taken at a licensed flight school. However, it is not sufficient to merely do away with unapproved courses and require instruction to be given at a licensed flight school. The actual commercial pilot's training with respect to minimums should be upgraded. As a first step the minimum number of hours should be increased to 200.

The present system of 20 hours ground school instruction cannot be considered as a serious attempt to instill in our pilots the necessary academic knowledge required in the name of aviation safety. I have already stated that ground school instruction should be carried out by qualified instructors. Furthermore, in the case of commercial pilots, I am of the opinion that the minimum ground school instruction should be increased to 40 hours.

AIRLINE TRAINING

Because Air Canada carries out initial and recurrent training programs for approximately 70% of airline pilots employed in Canada in the operation of turbo-jet transport aircraft of over 75,000 pounds, it was thought useful to examine into Air Canada's airline pilot training program.

At the present time, Air Canada's annual pilot training budget is in the order of \$10,000,000. The program was described as follows in the brief presented by the Air Transport Association of Canada:

> "The training facilities include simulators, training aids, classrooms, building etc. and are staffed by a total permanent departmental complement of 103 who are supplemented by as many as 65 temporary flight instructors throughout the annual training year.

Facilities are located at the two major pilot bases of Toronto and Montreal to accommodate the training needs of the Flight Operations Branch which supports the following corporate objectives and policies in the order of priority indicated:

1. Safety
2. Passenger Comfort
3. Schedule

Initial Training

Air Canada hires pilots possessing a Commercial Pilot Licence and Instrument rating. Since such pilots do not have the required background for rapid transition to flight crew duties on high performance commercial jet aircraft, Air Canada developed a training syllabus with the objective of providing a transitional bridge from the single pilot operation of a light single or twin aircraft to that of an effective crew member in the operation of a medium or heavy jet aircraft.

The training syllabus is designed to provide comprehensive coverage of those aspects of flight associated with high performance jet aircraft in scheduled operations and is considered the minimum standard of knowledge required by the new entry pilot.

The syllabus for the 15 working days for a new flight officers program is as follows:

1. Flight Operations: 30 Hours

   Subjects include company organization, administration, licencing and competency requirements, government regulations and air traffic control rules and procedures.

2. Aviation Meteorology: 12 Hours

   Review of Basic and High Altitude Meteorology with emphasis on in-flight problems related to thunderstorms, jetstreams, clear air turbulence, mountain waves and low level windshear. Meteorology Organization and Services available. Interpretation and application of Terminal Forecasts, Surface Weather and High Level Prog Charts.

3. Aerodynamics: 3 Hours

   Swept wing characteristics, flight controls, speed and altitude effects, stability systems, upsets, high speed and low speed buffet characteristics and limits.

4. Aircraft Performance: 4 Hours

   A knowledge of jet aircraft performance and jet engine capabilities sufficient to understand the variation of aircraft performance with

weight, pressure altitude and temperature changes - i.e., terminology, Government Regulations, performance criteria, equipment limitations. Performance data computations made during a typical flight profile.

5. Standard Operating Practices: 16 Hours

Standard crew coordination and aircraft operating procedures followed during preflight, preparation and operation of a typical transport flight. This includes passenger handling, flight planning and emergency procedures on land and water.

6. Basic Airplane Systems: 12 Hours

Avionics -
Radar, Inertial Navigation Systems, Instrument Landing Systems, Flight Instruments, Communications, Flight and voice recorders, etc.

Electrical and Lighting -
Types and sources of Electrical Power, Constant Speed Drive, Cockpit Controls, Bus Systems, etc.

Emergency Equipment -
Oxygen Systems, Emergency Exits, Emergency Lighting, Flotation Equipment, Fire Extinguishers, Engine Fire Protection, etc.

Jet Turbine Engines -
Types of Engines, Major Engine Component Functions, Engine Thrust, Cockpit Controls and Indicators etc.

Hydraulic Systems -
Pumps, Fluid Storage and Control, Landing Gear, Brakes and Antiskid, Flight Controls, etc.

Ice and Rain -
Effects on Airplane, Removal and Preventive Methods, Cockpit Controls and Indicators etc.

Pneumatic, Air Conditioning and Pressurization Systems -
Sources of Air Pressure, Air Conditioning Methods, Distribution Systems, Cargo and Equipment Cooling, etc.

7. Aviation Medicine: 2 Hours

Physiological and biological effects of flight crew re fatigue, rest, alcohol, medication, stress, pilot incapacitation, etc.

8. Examinations: 10 Hours

75% pass standard."

The new pilot will also have received extensive initial type training as relates to the particular aircraft for which he is being trained, which includes ground training, procedures training, second officer simulator training, second officer line indoctrination training and enroute flight checks.

The ATAC brief continued:

> "Recurrent Training
>
> All pilots are checked regularly to ensure that they maintain competency and are required to attend a briefing session on various subjects annually. There follows an extract from the Air Canada 500 Flight Operations Manual which covers regulations and instructions to all Pilots and Second Officers with respect to maintaining competency, including recurrent training."

Annual briefings are carried out on the subject of Category II and IIIA procedures, hijack procedures, restricted articles training, emergency procedures, pilot incapacitation, review of past aircraft accidents, and hypoxia.

Air Canada maintains a pilot safety awareness program comprised of a series of voluntary studies and review topics.

In addition, Air Canada has set up transition courses which take place when a pilot is to change his competency from one aircraft type to another. Additional training is carried out when a new model of the same type of aircraft is introduced.

Air Canada has two pilot flight training facilities located at Toronto and Montreal. The Toronto Flight Training Centre is equipped with five aircraft flight simulators for the following types: The Boeing 747, the Boeing 727, the Lougheed 1011, the Douglas DC-8 and the Douglas DC-9. Other training aids are also used. The Commission was advised that other major airline carriers carry out comparable training programs for their pilots.

Unfortunately, as has been noted in the earlier Volumes of this Report, many of the smaller carriers do not demonstrate the same sense of responsibility towards their pilots and passengers. By way of contrast with the professionalism of the major airline

carriers' training program, the Aircraft Operations Group submitted the following contract as an example of the conditions imposed by one charter operator on his student pilots. The student pilot is required to certify in writing that:

"(1) I hold a current Class II multi instrument rating and current commercial pilot's license, or higher.

(2) I have a minimum of Grade XII education.

(3) I am a non-smoker and understand smoking is strictly prohibited.

(4) I and my parents, or next of kin, are prepared to enter into the contract for a period of one year.

(5) I will pay to (Company X) the sum of $2,000.00 on the day of commencement of employment with (Company X).

(6) I am not on Unemployment Insurance.

(7) I will work with the experienced, professional pilots of (Company X) and fly as third crew member until I am approved by (Company X) to act as co-pilot or Captain of any (Company X) fleet, and carry out any duties that would be assigned by (Company X) - i.e. (assist to load the aircraft; give assistance to maintenance personnel on the aircraft).

(8) I will be required to study the Flight Operations Manual and Operations manual of all of the (Company X) Fleet, and to pass a written or oral examination.

(9) I will be on probation for two months in this training period, without income from (Company X).

(10) After two months, if the above is accomplished, I will give to (Company X) the sum of $2,000.00 and be given further training on the DC-3 and DC-4 and will be given a proficiency ride and endorsement on the DC-3 and within twelve months a proficiency ride and endorsement on the DC-4.

(11) Commencing the third month I will go on the payscale at $100.00 per week until the end of the term of the one-year contract.

(12) At any time during the contract, (Company X) will have the privilege to discharge the applicant if he is unable to meet the (Company X) standards. If the applicant has not received his DC-3 or DC-4 endorsement and proficiency ride, the applicant's deposit will be refunded.

(13) In consideration of the employer - (Company X) - agreeing to take the employee   into it's employ; the employee agrees that if he fails to perform his duties for the full term of his contract, without notice or right to repudiate this contract, he shall pay to the Employer, (Company X), the sum of $10,000.00 as liquidated damages for so doing, this amount being agreed upon as the amount of damages thereby sustained by the business of the Employer.

(14) The applicant will be provided with a uniform, including shirts, tie and jacket, at (Company X's) expense.

(15) The applicant will be required to keep a flight bag in order -i.e. charts, revisions, etc., at (Company X's) expense.

(16) I understand (Company X) will provide an unfurnished room in the hangar at no charge to me."

(Emphasis added.)

One observer commenting on the above contract noted that in some quarters "slavery is still alive and well in Canada".

COMMENT

I am satisfied that the pilot training programs conducted by the major airline carriers in Canada are carried out with responsibility and with a commitment to aviation safety. This cannot be said of many of the smaller carriers to whom reference has been made in the earlier Volumes of this Report. In the next general inspection of air carriers by the DOT, a report should be prepared in each region evaluating the training programs of the individual carriers, and these reports as to the adequacy of pilot training programs in the regions should be submitted to the Air Administrator.

PART IV

LICENSING AND INSPECTION

ORGANIZATION

The responsibility for flight training and examination belongs to the headquarters LICT Section, a part of the Aeronautical Licensing Division which in turn is part of the Licensing and Inspection Branch. The LICT Section consists of a Section Head supervising four training specialists and five examination specialists. This Section states as its objective:

> "To develop & administer a programme which will ensure that a satisfactory standard of training is maintained in Canada."

The following excerpt from the CATA brief on flight training explains the respective responsibilities of Headquarters and the Regions:

> "Except for the Flight Instructor Refresher Courses, Designated Flight Test Examiner Workshops and Flying Training Evaluation Teams, all interface with industry in the area of aviation personnel licensing is the responsibility of regional personnel.
>
> Regional Flight Training Standards Inspectors conduct inspections required for the issue of an operating certificate for flight training. Routine operating certificate inspections of each club or school are required to be conducted annually. Lack of staff in some regions has made it impossible to conduct these inspections in accordance with the guide lines. HQ records show there were 203 of the 301 clubs and schools in Canada inspected during the period of October 1, 1978 - September 30, 1979.
>
> The responsibility for control of the standard of flight training for the private and commercial licences and multi-engine endorsement rests on the Regional Flight Training Standards Inspector. To achieve this, these inspectors
>
> a) conduct all flight tests for initial issue and renewal of the flight instructor rating.
>
> b) conduct all flight tests for issue and renewal of DFTE authority. All monitoring and flight test standards of DFTE is the Flight Training Standard Inspector's responsibility.

c) conduct monitoring tests of a sample of students trained at all clubs and schools."

The organizational problems within CATA encountered in other sections and departments were also encountered in matters of personnel licensing. I shall shortly be discussing the Glynn case which illustrates the tragic consequences of a lack of responsiveness to an urgent problem. But there are as well other problems which, while not as dramatic as the Glynn case, nevertheless underline the need that lies ahead for the streamlining of the organization of the Air Administration. In this respect, Mr. Paul A. Rivers, a Personnel Licensing Officer in Ontario, made the following comment:

> "There are days when there is no direction. I do not think during the five years I have been there that we have ever been more than three weeks current. There has always been at least a two to three week back-log of work. You cannot go home at night knowing that you have got your day's work completed. There are about 20 or 30 files pending on your desk that you have to face the next day.
>
> And it is not due to any major problem. It is due to a lot of small things that never seem to be addressed. Little office procedures, practices. <u>For a long, long time we had no one stop reference on how to carry out a licensing function. If you were to say to me student pilot permit, I could show you two different reference manuals and three different files that all contain information on the student pilot permit. Some of it was conflicting</u>." (Emphasis added.)

MONITORING OF FLIGHT TESTS

Inspector Peggy Wilson, to whom reference has already been made, advised the Commission that although inspectors are supposed to spot test private licence candidates, she has been able to monitor only two such tests in the past year. She would like to monitor one in ten candidates, but the current figure is approximately 3%.

Inspector Wilson said that any form of flight review of licensed pilots must be done by a Designated Flight Test Examiner since "they are the only ones originally qualified to say who passes or fails."

The Designated Flight Test Examiner (DFTE) is a qualified flight instructor who has the authority to conduct private, commercial and multi-engine flight tests at a particular

flight school. The Aircraft Operations Group expressed concern that the DFTE system is not properly monitored and that unqualified students are passing flight tests carried out by the DFTEs.

The following is a excerpt from a January 28, 1980 memorandum to the Ontario Regional Administrator from the Director General, Civil Aeronautics:

> "The Designated Flight Test Examiner Programme was set up in 1974 with the objective of providing prompt flight testing services whenever practicable in locations which would make it unnecessary for applicants to travel excessive distances to obtain the flight test for Private, Commercial and Multi-engine licences and endorsements.
>
> In delegating these tests to the industry, Transport Canada assumed the responsibility for monitoring these industry examiners, as indicated in Inspection Instructions 3.7.12.20.
>
> <u>It has been brought to my attention that a serious situation exists in Ontario Region in that the number of Flight Training Standards Inspectors has recently been reduced from 5 to 4, thereby making an already precarious situation untenable. Headquarters auditing of the Designated Flight Test Examiner records indicates that virtually no monitoring is taking place, due to the fact that the inspectors' time is taken up fully by flight instructor rating tests.</u>"
> (Emphasis added.)

The statistics on flight tests monitored by the regional inspectors for 1980 indicate that in many cases DOT monitoring is in fact less than the goal of 10%, and the statistics as well show a wide disparity among regions. The Western Region, for example, monitored less than 1% of private flight tests in that year, as appears in the chart on the following page:

1980 PRIVATE, COMMERCIAL AND MULTI FLIGHT TESTS

DELEGATION OF AUTHORITY AND MONITORING BY MOT

	Private				Commercial				Multi			
	Total	Industry	MOT	%Monitoring	Total	Industry	MOT	%Monitoring	Total	Industry	MOT	%Monitoring
Pacific	1075	965	110	10.2%	373	288	85	22%	246	229	17	6.9%*
Western	940	933	7	0.7*	192	180	12	6.3*	137	132	5	3.6*
Central	1056	1032	24	2.2*	214	200	14	6.5*	114	86	28	25.0
Ontario	1556	1538	18	1.1*	379	355	24	6.3*	232	177	55	24.0
Quebec	1044	1013	31	3.0*	340	311	29	8.5*	169	133	36	21.3
Atlantic	347	306	36	10.4	217	123	56	25.8	88	33	55	62.0
TOTAL	6015	5789	226	3.7%*	1715	1495	220	12.8%	987	791	196	19.9%

MOT monitoring of less than 10% is indicated by an asterisk.

A wide disparity of monitoring exists between Regions.

Inspector Peggy Wilson also pointed out that there is no time limit on hours flown or in years taken to complete the flight test. She mentioned the case of a person who took two years and 300 hours of flying to get the licence compared to the national average of around 50 hours. She said:

> "A ... it has been a lifelong ambition with this person to learn to fly, somewhat as a status symbol, I think, because he had been told by people that he worked with that he could not get a licence. So I had to give him credit for perseverance but he came out to learn to fly just about every day. And from what I understand he was passed from instructor to instructor as one instructor would say I've had enough, I cannot teach this person, he would be passed on to another instructor.
>
> Q At what intelligence level was this person?
>
> A When he came to the particular school he had some reports that a school for the handicapped had done on him and he had reached an age 12 level, in which they felt that he could learn at that level and retain knowledge at that level.
>
> Q I gather this person eventually became a pilot?
>
> A Yes.
>
> Q To your knowledge is he still a pilot?
>
> A Oh, he is still a pilot."

COMMENT ON FLIGHT TESTS

The goal of the flight training standards inspectors to monitor 10% of the flight tests carried out in the regions is, I think, a matter which should be achieved, and consideration should be given to increasing their capacity to do so. Furthermore, there should be a time limit within which the hours flown must be completed in order to qualify for a flight test. This would avoid the difficulties which have arisen by permitting student pilots to receive flying credits for flying hours extended over a period of many years. The student pilot should be current before qualifying for a flight test.

PART V

PILOT PROFICIENCY AND PILOT RECENCY

INTRODUCTION

CASE STUDY - JOHN RICHARD GLYNN, GLIDER PILOT, FATAL ACCIDENT, MAY 22, 1977

The inquiry into the fatal accident of Mr. Glynn demonstrated a severe weakness in the procedures in place for the removal of flying privileges and demonstrated the need for pilot proficiency and recency requirements. The removal of the flying privileges of a pilot, who, although licensed, has subsequently demonstrated incompetency, is as equally significant as the granting of a licence in the first place.

Mr. John Glynn, of Limehouse, Ontario, received a glider pilot's licence in 1975. On February 28, 1977 Mr. Jack Dodds, then Chief Flying Instructor of the Erin Soaring Society, who had initially recommended the granting of the glider pilot's licence to Mr. Glynn, wrote the following letter to Transport Canada:

> "Mr. John Glynn of Limehouse, Ontario was recommended for a Glider Pilot Licence by me in August, 1975, and subsequently received a licence.
>
> In April, 1976, in the 'spring checkout' required by club rules, he did not demonstrate a level of competence adequate to permit sole flying. He continued flying dual with club instructors. On May 2, 1976, the Instructors Panel of the Erin Soaring Society decided to keep him on dual instruction indefinitely. On July 4, 1976, the Instructors Panel concluded that he had made no significant progress, and decided that he will not be permitted to fly solo at this club, and that he should be asked to cease training.
>
> Mr. Glynn's performance is erratic. He is able to handle normal manoeuvres safely most of the time, but will often follow one, two, or several safe flights with a flight in which a gross error is committed. When he does commit an error, he often seems unaware that he has done so. When such an error is pointed out by an instructor, he often will not acknowledge its seriousness. He consistently will tell an instructor, prior to a flight, that the instructor on the previous flight found no significant faults in his flying; when in fact serious faults were present and were explained in detail by the previous instructor.

> For example, one instructor reported to me that, during an otherwise normal final approach to land, Mr. Glynn permitted the glider's airspeed to drop to 5 m.p.h. above the stall, and the airspeed was still dropping when the instructor told him to 'put the nose down.' The instructor discussed the incident with Mr. Glynn after the landing. Prior to his next flight, with a new instructor, Mr. Glynn said that he had had 'no problems' on the previous flight.
>
> In my opinion, Mr. Glynn is not competent to safely exercise the privileges of a Glider Pilot Licence, and there is little hope that he will gain this competence in the forseeable future. If he is permitted to use his licence, there is a significant risk that he will be involved in an accident. The Instructors Panel of this club, which consists of all the active, rated glider instructors in the club, has concurred with this opinion.
>
> I must therefore regretfully recommend that Mr. Glynn's Glider Pilot Licence be revoked."
> (Emphasis added.)

Mr. Dodds explained that the instructors' panel, referred to, which decided that Mr. Glynn was incompetent to continue to hold a glider pilot's licence, consisted of seven to ten licensed instructors.

Mr. Dodds further testified:

> "We could not check out John Glynn and he seemed to be getting worse and not better. Eventually we told him we weren't going to let him fly solo, period. And in fact we told him we felt that the standard of performance that he was showing was unsafe and we thought it would be dangerous for him to go flying again.
>
> We asked him to give us his licence and we would return it to MOT. That was a rather futile move as it turned out.
>
> Shortly after this decision was made he stopped appearing at the field and because of the nature of his problem which was essentially that he was erratic - he could fly, he could put together a number of good flights and then he would make a real gross error.
>
> For that reason we started thinking about it and saying, well, this guy could go to another club and he could probably convince them that he is perfectly competent and therefore we should try to do something about it. But we really didn't know what to do."

He further explained why a single assessment by another examiner might not detect the problem:

"We wanted to provide a basis for some objective evaluation to be made, and in particular I wanted to state that the problem was that the guy was erratic so that they wouldn't send some other person who would go and have two check flights with him and say this guy is okay because he had been able to do that with us. It was only when we looked at 10 flights and so on that we saw problems. . . .

So it seems to me that I understand from another letter which is in the file that the MOT was trying to find another person who was qualified to essentially give John Glynn a check ride.

I personally feel that that might not have prevented this accident.

In order for that guy, the person who would give the check ride, to be able to be effective, he would have to know what to look for. And in order to do that he would have to talk to the people who had originally recommended, to us, because we had observed it."
(Emphasis added.)

Mr. Dodds received no reply from the Department to his letter.

On May 22, 1977 Mr. Glynn was fatally injured. The accident report described the flight as follows:

"At approximately 13:01 hours EDT on May 22nd, 1977 a Schweizer SGS1-26B piloted by John Richard Glynn took off in tow behind a Citabria aircraft operated by the Toronto Soaring Club from a private airstrip near Conn, Ontario.

The take off was described as normal by several witnesses on the ground and the tow pilot G. H. Bailey.

The climb out was reported to be routine until the aircraft had risen to about 400' above ground.

At this point the tow pilot stated that the tail of his aircraft suddenly felt like it was being dragged downwards, so much so that he had to place both hands on the stick and push forward to prevent his aircraft from stalling.

He then reported that the next thing to happen was that a heavy back pressure was required to prevent the aircraft from being pitched nose down.

He could not see the glider at this time but the feeling on the stick of his aircraft was that the glider had first dove down below the tow aircraft and then had climbed to a high angle above. Both these positions were considered abnormal and would suggest control problems with the glider.

Mr. Bailey described then how his aircraft began to slow down to 60 MPH as the glider was acting like a kite being at a high angle of attack.

Suddenly, the glider released and his aircraft quickly regained normal cruising speed and after a few seconds he turned his aircraft to the right to see the glider spinning down to strike the ground.

The aircraft struck the ground at a steep nose down angle of about 80° while turning to the right. The nose of the aircraft dug a hole in the sod field 11" deep and approximately 1 foot in diameter. It then nosed over and came to rest inverted about 10' away.

Two local farmers Grant Kirby and George Ferrier who had seen the aircraft spiral down and strike the ground rushed over to render assistance. They found that the pilots' body had fallen out of the aircraft so that his upper portion was on the ground while his legs were in the aircraft. They did not have to remove any restraining harness to remove the pilot as when they lifted the nose of the aircraft the pilots legs fell out.

The pilot sustained massive fractures to the skull and fractures to upper cervical vertabrae, face and upper and lower extremeties.

The cause of death was given as: Shock secondary to skull fractures and fracture dislocation of the upper cervical vertabrae."

It was later conjectured that the pilot lost control while trying to fasten his shoulder harness.

In replying to a letter from the Office of the Chief Coroner of Ontario, which sought information how to prevent a similar accident in the future, Mr. Donald R. Sinclair, Regional Superintendent, Air Regulations, Ontario Region, gave an explanation as to why no action had been taken in response to Mr. Dodds' recommendations:

"With reference your letter of July 27, 1977 notwithstanding your information that in July 1976 we were sent a letter from a group of instructors from the Erin Soaring Society outlining Mr. Glynn's shortcomings as a pilot, such advice was not received here until March 1977 and then it was from an instructor, Mr. Jack Dodds. He indicated that his club's instructors had decided on July 4th, 1976 that the pilot concerned should be asked to cease training but did not explain why, after eight months, they decided to notify this office of that decision. I should mention here that there is no legal requirement for such notification. It was also Mr. Dodds' opinion that Mr. Glynn's Glider Pilot Licence should be revoked.

I would digress from the specifics of this case to explain our present licensing system as it applies to the 35,000 or more persons holding recreational type pilot licences in Canada today. Only when the licence is issued do we have current certification and proof of competency and knowledge in relation to an established standard. From that point on the system relies on the good judgment of the individual concerned, and the assumption that an aircraft owner will, for obvious reasons, ensure that the pilot's competency has not deteriorated below an acceptable level before allowing him/her to fly the aircraft as pilot-in-command. Such a system, I must admit, while not perfect, has worked well up to this point in time. Any suggestion that these pilots should be re-tested at regular intervals could be likened to the task of re-testing all drivers of motor vehicles in Ontario. In any event, I have been advised that Mr. Glynn was given a thorough check-out by the Toronto Soaring Club and declared competent to act as pilot-in-command prior to being given the aircraft for the flight which resulted in his death May 22, 1977.

<u>Before invoking Section 407(b) of the Air Regulations (which allows for the suspension of a licence) following receipt of an outside opinion of incompetence, it is our usual practice to ensure that another unrelated judgement is made either by a qualified Civil Aviation Inspector in our employ or a Flight Instructor to ensure that personality differences are not involved. Therefore, upon receipt of Instructor Dodds' letter we made contact with Mr. W. J. Piercy, the past president of the Soaring Association of Canada, who represent 48 gliding clubs across Canada including both the Erin Soaring Society and the Toronto Soaring Club who owned the aircraft in which Mr. Glynn met his death, with a view to having this association provide another assessment. At the suggestion of Mr. Piercy, we were attempting to contact the current president Mr. T. R. Beasley when notified of the fatal accident</u>.

It is my personal opinion that no amount of legislation or suspension of licences will ever remove from the air 100% of those who, while they are few, should not be there. Over the years I have been associated with this office there have been numerous examples of mature, well-educated persons, such as Mr. Glynn, flying when their licences have been invalid, for a variety of reasons, such as a recent case involving a pilot who, though he had lost the use of an arm through paralysis following a stroke, continued his flying activities until being involved in an accident.

Therefore, it becomes a matter of attitude towards aviation safety and respect for oneself and others. With a view of fostering a correct attitude, we have recently established a Regional Aviation Safety Officer position. Its sole purpose is that of identifying flight safety related weaknesses in our systems and promoting healthy respect and attitude of those involved towards the whole subject. . . ."
(Emphasis added.)

It is to be noted that at the time of Mr. Glynn's death no action had been taken by Transport Canada to follow up the very serious concern expressed with respect to Mr. Glynn's competency, although they had been so notified approximately three months before the fatal accident. Indeed, at the time of Mr. Glynn's death, only a casual contact was being attempted to obtain a further opinion as to Mr. Glynn's competency.

With respect to the alleged difficulty expressed by the Department in obtaining an independent assessment, Mr. Dodds commented:

> "I noticed from Mr. Sinclair's letter that they have some trouble getting in touch with a person that they consider to be an independent authority. Well, I could have picked up the phone in 10 minutes and found such an independent authority, you see."
> (Emphasis added.)

When asked whether he found three months a lengthy delay in contacting someone for an assessment of Mr. Glynn's proficiency, Mr. Sinclair responded:

> "A Yes, I do.
>
> Q Have you any suggestions as to how that delay might be shortened in the future?
>
> A The only thing I can say at this point in retrospect two and a half years later is that the resources were not available during that - I believe it was ten or eleven weeks; it wasn't quite three months - to follow this thing through to a satisfactory conclusion.
>
> As I indicated we have had other occurrences of people, the medical profession advising us of someone whose health is not up to standard and his licence should be suspended. We have been able to deal with those in the past satisfactorily.
>
> MR. COMMISSIONER: I don't mean to be disrespectful but that constant answer of a lack of resources, with all respect, I think would hardly be applicable here. All it took was a phone call.
>
> THE WITNESS: Well, the supervisor who was handling this tells me he made a number of phone calls and left his number and put the file aside and the phone calls were not returned. Obviously when they weren't returned we should have followed an alternate course of action."
> (Emphasis added.)

Mr. Andrew G. Carswell, an Ontario Regional Aviation Safety Officer, reviewed the case in connection with another matter. He arrived at the following conclusion:

> "It seems clear, from a study of the file, that the gliding club officials, in March, 1977, requested the Ministry to remove Glynn's license on the grounds of incompetence, obviously feeling that an accident was imminent. Admittedly, the person who recommended Glynn for a license in the first place, erred. <u>Having seen his serious misjudgement, he attempted to rectify it, but ran up against our bureaucracy. In May, 1977, Glynn was involved in a fatal accident, which could have been prevented, had his license been removed</u>." (Emphasis added.)

COMMENT

It is difficult to understand the complacency of the Ontario Regional Office of the Air Administration in its failure to respond to Mr. Dodds' letter and to act upon it. It was significant that it was Mr. Dodds who had initially recommended the granting of the glider pilot's licence to Mr. Glynn. The letter was a very full explanation of the reasons which moved Mr. Dodds to write suggesting that Mr. Glynn's licence be removed. It had the full support of the instructors' group of the Erin Soaring Society. The very nature of the letter commanded an immediate response.

It is, of course, a serious step to remove a licence once it is granted, and the practice of seeking independent advice is, in most cases, commendable. But, in this case, there was no reason why such advice could not have been immediately obtained. It is too easy, as has been the practice in so many cases, to blame the lack of action on the lack of resources, as was suggested in this case. All that was needed was for someone to make one or two telephone calls which would have resulted in obtaining the assistance needed to assess Mr. Glynn's competency. After approximately three months no such person was contacted. If Mr. Glynn's licence had been removed, it seems unlikely that he would have been given the opportunity of gliding at any premises where such activities are carried out and, in all probability, as Mr. Carswell pointed out, the fatal accident could have been prevented. It is apparent that administrative procedures must be improved upon to avoid the repetition of such a tragic and unnecessary fatal accident. As I have already noted, this case study also demonstrates the need for the adoption of pilot proficiency and pilot recency requirements.

PILOT PROFICIENCY

Under the system presently in use in Canada, once a private pilot has obtained his licence, it remains valid as long as the pilot remains medically current by undergoing a medical examination every two years, if under the age of 40, or annually if over the age of 40. Thus a private pilot is legally able to fly an aircraft even though he may not have flown over the past ten or even twenty years, provided that he is medically current.

A licensed commercial pilot who flies single-engine aircraft under visual flight rules is also not required to undergo any form of periodic flight check or flight review as long as he remains medically current.

A commercial pilot with an IFR rating must undergo an annual or semi-annual flight check in order to renew his instrument rating.

A commercial pilot flying a multi-engine aircraft for hire must undergo an annual pilot proficiency check (PPC) in order to qualify him for the type of aircraft in which he seeks to fly passengers for hire.

For many years the question of pilot proficiency has been under review, both in Canada and elsewhere. The present Canadian requirements are not as stringent as in many other jurisdictions.

The ICAO proposal, to which I have previously referred, sought to introduce a new system designed to ensure that all licensed personnel, including private pilots, maintain their competency by meeting recent flight experience requirements and by undergoing periodic reviews as to their competency.

The matter is dealt with in the United States by Federal Aviation Regulation 61, which provides in part:

> "61.57 **Recent flight experience: Pilot in command.**
>
> **(a) Flight review.** After November 1, 1974, no person may act as pilot in command of an aircraft unless, within the preceding 24 months, he has-

(1) Accomplished a flight review given to him, in an aircraft for which he is rated, by an appropriately certificated instructor or other person designated by the Administrator; and

(2) Had his log book endorsed by the person who gave him the review certifying that he has satisfactorily accomplished the flight review.

However, a person who has, within the preceding 24 months, satisfactorily completed a pilot proficiency check conducted by the FAA, an approved pilot check airman or a U.S. armed force for a pilot certificate, rating or operating privilege, need not accomplish the flight review required by this section.

(b) Meaning of flight review. As used in this section, a flight review consists of-

(1) A review of the current general operating and flight rules of Part 91 of this chapter; and

(2) A review of those maneuvers and procedures which in the discretion of the person giving the review are necessary for the pilot to demonstrate that he can safely exercise the privileges of his pilot certificate.

(c) General experience. No person may act as pilot in command of an aircraft carrying passengers, nor of an aircraft certificated for more than one required pilot flight crewmember, unless within the preceding 90 days, he has made three takeoffs and three landings as the sole manipulator of the flight controls in an aircraft of the same category and class and, if a type rating is required, of the same type. If the aircraft is a tailwheel airplane, the landings must have been made to a full stop in a tailwheel airplane. For the purpose of meeting the requirements of the paragraph a person may act as pilot-in-command of a flight under day VFR or day IFR if no persons or property other than as necessary for his compliance thereunder, are carried. This paragraph does not apply to operations requiring an airline transport pilot certificate, or to operations conducted under Part 135 of this chapter.

(d) Night experience. No person may act as pilot in command of an aircraft carrying passengers during the period beginning 1 hour after sunset and ending 1 hour before sunrise (as published in the American Air Almanac) unless, within the preceding 90 days, he has made at least three takeoffs and three landings to a full stop during that period in the category and class of aircraft to be used. This paragraph does not apply to operations requiring an airline transport pilot certificate.

(e) Instrument - (1) Recent IFR experience. No pilot may act as pilot in command under IFR, nor in weather conditions less than the minimums prescribed for VFR, unless he has, within the past 6 months-

(i) In the case of an aircraft other than a glider, logged at least 6 hours of instrument time under actual or simulated IFR conditions, at least 3 of which were in flight in the category of aircraft involved, including at least

six instrument approaches, or passed an instrument competency check in the category of aircraft involved.

(ii) In the case of a glider, logged at least 3 hours of instrument time, at least half of which were in a glider or an airplane. If a passenger is carried in the glider, at least 3 hours of instrument flight time must have been in gliders.

(2) Instrument competency check. A pilot who does not meet the recent instrument experience requirements of paragraph (e)(1) of this section during the prescribed time or 6 months thereafter may not serve as pilot in command under IFR, nor in weather conditions less than the minimums prescribed for VFR, until he passes an instrument competency check in the category of aircraft involved, given by an FAA inspector, a member of an armed force of the United States authorized to conduct flight tests, an FAA-approved check pilot, or a certificated instrument flight instructor. The Administrator may authorize the conduct of part or all of this check in a pilot ground trainer equipped for instruments or an aircraft simulator."

In Canada, a study on pilot competency checks was undertaken by Messrs. Leonard J. Harker, W. P. Paris and H. Pickard at the request of the Ministry of Transport. They were a project team representing both the Canadian Government and the Canadian Flying Training Industry, and they made the following findings and recommendations:

"PILOT COMPETENCY CHECKS

GENERAL

After consultation with U.S. and U.K. government and industry officials and undertaking a detailed appraisal of the Canadian system, the project team concluded that at present the Canadian licensing programme does not provide sufficient means of ensuring pilot ability is maintained after initial license issue, except where pilot duties require periodic checks.

In the opinion of the project team, introduction of a periodic mandatory competency flight check or review can be instituted in Canada within the resources available and would provide a significant and useful contribution to the interest of flight safety.

It is believed that a competency test concept, i.e. pass/fail with associated loss of license is too severe an approach and could well negate the usefulness of the programme. On the other hand, a 'Flight Review' concept is considered to be more practical, effective and more easily realized.

RECOMMENDATION

It is recommended that a flight review programme be introduced as follows:

(a) a flight review of standard format be required of every licensed pilot at intervals not exceeding 24 months. Pilots who have, during the specified time period, successfully passed any other flight test recognized by the MOT, shall be deemed to have met the flight review requirements;

(b) except as otherwise authorized by an R.S.A.R., flight reviews shall be conducted by Class I or II flight instructors;

(c) upon successful completion of a flight review, the examiner will so certify by means of:

(i) an entry in the pilot's log book,

(ii) an appropriate licence endorsement, or

(iii) in such other manner as may be determined by MOT.

(d) in event of unsatisfactory candidate performance, the examiner will provide the MOT Regional Office with the flight review results and will not make any certification as above described. NOTE: In the event of (d) above, the Ministry of Transport will decide upon and advise the candidate concerning continuance of licence privileges.

A standard format flight review should be developed jointly by RCFCA and ATAC and submitted to the MOT for approval."
(Emphasis added.)

PILOT RECENCY

The ICAO proposal, to which I have referred, introduced the concept of pilot recency requirements. For instance, in the section relating to single-pilot rating and endorsements, the proposal stated:

"5.3.8 Recency Requirements. The holder of a single-pilot rating shall only exercise the privileges of that rating:

a) by DAY if he has completed within the previous 180 days not less than 6 take-offs and landings as pilot-in-command, by DAY or by NIGHT, of an aeroplane for which he holds a class or type endorsement;

b) by NIGHT if he has completed within the previous 90 days not less than 3 NIGHT take-offs and landings as pilot-in-command of an aeroplane for which he holds a class or type endorsement;

c) and carry passengers or, as the holder of a professional pilot licence, engage in revenue earning flights if he has completed within the previous 90 days not less than 3 hours as pilot-in-command, of which not less than 1 hour shall have been within the previous 60 days, or an aeroplane for which he holds a class or type endorsement.

5.3.8.1 RECOMMENDATION. - When the flying specified above is conducted in a tail-wheel aeroplane, the landings should be made to a full stop.

5.3.8.2 If unable to satisfy any of the recency requirements, as appropriate, and before continuing to exercise the privileges of his rating, the holder shall complete a satisfactory proficiency check as pilot-in-command of an aeroplane in that class or of that type. The check shall be conducted by an approved person authorized by the Licensing Authority for that purpose."

COMMENT ON PILOT PROFICIENCY AND PILOT RECENCY

A review of many accident reports disclosed that many accidents are caused by reason of the pilot being unable to deal with the particular emergency with which he is confronted. I have already proposed an improvement in flight training standards, flight training curriculum and flight training tests, all of which would, if adopted, increase the ability of the pilot on obtaining his licence to safely navigate his aircraft in unanticipated or emergency situations.

However, it is clear that there is a need for checking on pilots' continued competency. There is no doubt that a pilot who has not recently flown an aircraft does not maintain the necessary skills to react to an emergency. This, I think, is particularly so for private pilots who, in many cases, fly at irregular intervals.

As I have noted, the accident rate in general aviation in the United States has of recent date rather dramatically improved, whereas no such improvement appears in the field of general aviation in Canada. I am satisfied that one of the reasons for this is because of the flight review and competency checks provided for in the Federal Aviation Regulation 61, reproduced above.

In my opinion, a biennial flight review should be mandatory in Canada. Every twenty-four months, to prolong the privileges of the licence, and to prove current competency, a pilot should be obliged to undergo a flight review conducted by a flight examiner or a qualified flight instructor. The successful completion of such a review should be certified by the examiner by an entry in the pilot's log book or in any other suitable manner.

Furthermore, an annual flight check should be given to all commercial pilots who only fly single-engine aircraft under visual flight rules. As I have mentioned, these pilots do not presently have to undergo any annual or semi-annual IFR flight checks or pilot proficiency checks.

Obviously, pilots who have, during the 24 month flight review period, successfully passed any other flight check recognized by the Department of Transport, such as an IFR flight check, a P.P.C., or the annual flight check for commercial pilots flying single-engine VFR, would not have to undergo the flight review.

I am also of the opinion that the adoption of pilot recency requirements will contribute substantially to aviation safety. The ICAO minimums should be used as the Canadian minimums. If the recency time limits are found to create a hardship for seasonal pilots, some relaxation of these limits could be considered for them.

PART VI

FLIGHT TIME AND FLIGHT DUTY TIME

Pursuant to section 6.(1)(k) of the Aeronautics Act, subject to the approval of the Governor in Council, the Minister of Transport may make regulations with respect to:

> "the maximum hours of work and other working conditions for pilots, co-pilots, navigators and flight engineers employed by any person operating a commercial air service licensed by the Canadian Transport Commission;"

The Air Regulations also provide as follows:

> "**410.** (1) The Minister may, in respect of the operation of aircraft, make orders or directions prescribing flight time limitations and rest periods for flight crew members.
>
> (2) A flight crew member who reaches a flight time limitation prescribed pursuant to subsection (1) shall be deemed to be fatigued, and shall not continue on flight duty or be re-assigned to flight duty until such time as he has had the rest period prescribed pursuant to subsection (1)."

It is well known that a pilot's ability to function is directly dependent upon his state of physical awareness, which state can be affected by lack of sleep or by long periods without adequate rest. Considerable testimony was presented concerning pilots who, voluntarily, or on the instructions of their employers, fly excessively long hours. In Volume 2 of this Report I noted the following finding in the Northern Ontario Aviation Safety Study Report:

> "Pilots are expected to fly and work hours greatly in excess of established guidelines and remuneration is structured to encourage this practice."

As a result, the authors of that report recommended:

> "That maximum flying and duty times for aircrew be incorporated in the ANO's and enforced."
> (Emphasis added.)

The Air Administration's summary of the Northern Ontario Aviation Safety Study Report prepared for the Minister included the following comments:

> "Although Transport Canada has not issued regulations specifically setting out hours of duty, it has issued an Information Circular which sets out acceptable levels in order to reduce the possibility of crew fatigue. These levels have been accepted by the Industry in general as being practical and good practice.
>
> Within the report are transcripts of statements by crew members that they or their colleagues have been pressured into seriously exceeding the accepted levels even to the extent of being on duty up to 20 hours, with over 13 hours flight time, and being required to be back on duty after a rest period of less than 3 hours. There are also statements that 15-16 hours a day, every day, is a regular occurrence.
>
> Pay scales for crews encourage working long hours because the more flight hours a pilot completes the better his scale of pay. In many cases pilots also have aircraft maintenance or other duties to perform prior to and after a lengthy day of flying."
> (Emphasis added.)

An example of excessive flight duty times appeared in the Case Study of Athabaska Airways, to which reference was previously made, in which a Transport Canada inspector expressed concern about the number of hours flown by the company's pilots. The inspector wrote "the hours flown by this pilot during June, July and August must be considered a hazard to flight safety. This, combined with excessively long duty days, calls into question the ability of Athabaska Airways to conduct a safe service".

As mentioned above, flight times and flight duty times have not been made mandatory, but have been the subject matter of the following information circular published in 1973:

> "1. INTRODUCTION
>
> (a) The following Standards relative to flight time and flight duty time limitations shall apply to all flight crew members employed in air carrier operations involving:
>
> (i) the operation of aircraft having a gross weight for take-off in excess of 12,500 lbs., and
>
> (ii) the operation of any aircraft on services certificated for operation under IFR weather conditions.

NOTE: Notwithstanding (i) and (ii) above, the flight time limitations set out herein may be applied to the operations of any air carrier if it is determined that such limitations are necessary to maintain an acceptable level of safety in such operations.

(b) The limitations and definitions set out hereunder have been established for the sole purpose of avoiding fatigue which would endanger air safety.

2. APPLICATION

(a) The provision of maximum flight and flight duty times and the minimum rest periods hereunder does not relieve a flight crew member from complying with Section 409(2) and 410 of the Air Regulations. It shall be the responsibility of the flight crew member to refrain from any activity which might cause him to be fatigued at the commencement of his duty period.

(b) It shall be the responsibility of the operator to incorporate, in an Operations Manual, limitations appropriate to his operation which do not exceed the limitations specified herein.

(c) An operator shall, when establishing limitations, take into account the following:

(i) type of aircraft, equipment and crew complement;

(ii) frequency of take-offs and landings;

(iii) times of scheduled arrivals and departures;

(iv) route flown;

(v) rest and flight relief facilities;

(vi) the probability of operational delays.

3. DEFINITIONS

(a) Flight Crew Member is as defined in Part 1 of the Air Regulations.

(b) Flight Time is the total time from the moment an aircraft first moves under its own power for the purpose of taking off until the moment it comes to rest at the end of the flight.

NOTE: Flight time as here defined is synonymous with the term 'block to block' time in general usage which is measured from the time the aircraft moves from the loading point until it stops at the unloading point.

(c)	Flight Duty Time	is the time necessary to prepare for, execute and terminate a flight or series of flights and the administrative functions associated therewith. NOTE: The term 'series of flights' is used to indicate flights uninterrupted by a rest period.
(d)	Flight Relief Facilities	are accommodations available to the flight deck which provide privacy, ventilation, and adequate dimensions for prone rest.
(e)	Flight Deck Duty Time	is any portion of flight time spent at a position for which a flight crew member is required.
(f)	Rest Period	is a period spent on the ground during which a flight crew member is relieved of all duties associated with his employment.
(g)	Period of Time	is as follows:

(i)	Day	24 consecutive hours.
(ii)	Month	30 consecutive days.
(iii)	Quarter	90 consecutive days.
(iv)	Year	Calendar Year.

4. FLIGHT TIME LIMITATIONS

(a) The flight time of a flight crew member shall not exceed:

(i) 120 hours in any month;

(ii) 300 hours in any quarter;

(iii) 1200 hours in any year.

NOTE: Upon application to the Ministry by the air carrier, and with the written agreement of the flight crew members concerned, flight time in any one month may be increased to a maximum of 150 hours provided the Ministry is satisfied that it is reasonable to do so.

5. FLIGHT DUTY TIME LIMITATIONS

(a) The flight duty time of a flight crew member shall not be scheduled or planned to exceed 15 hours in any day, except under the following circumstances:

(i) the flight crew includes 3 or more pilots, at least 2 of whom are qualified by the operator to act as pilot-in-command;

(ii) flight relief facilities are available for each flight crew member relieved of flight deck duty;

(iii) no flight crew member is scheduled to exceed 12 consecutive hours flight deck duty time; and

(iv) the flight duty time does not exceed 24 hours.

6. EXCEPTIONS TO THE LIMITATIONS

(a) The limitations herein may be extended if, in the judgment of the pilot-in-command, it is safe to do so for the following purposes:

(i) engagement in search and rescue activities;

(ii) provision of relief in cases of distress; or

(iii) completion of a flight duty period which operational conditions has extended beyond the limitations.

(b) When the daily flight duty limitation period of 15 hours is exceeded by more than 1 hour, and subject to the exceptions indicated above, or when any other of the limitations are exceeded by any amount, a report in a method acceptable to the Ministry of Transport shall be made by the pilot-in-command to the operator.

7. REST PERIODS

(a) A rest period of sufficient length shall be provided which, taking into account the amount and type of duty preceding and following the rest period, will ensure time for adequate rest prior to undertaking a flight.

(b) A rest period shall in no case be less than 8 consecutive hours of prone rest in the rest facility."

Following the publication of the circular, the Air Administration forwarded 14,000 questionnaires to pilots and 3,200 questionnaires to operators seeking their response. Approximately 2,000 questionnaires were returned. Pilots, by a four to one majority, favoured legislation making maximum flight times and flight duty times mandatory. The operators who responded favoured legislation by a ratio of two to one.

COMMENT

For the most part, flight crews for the major airlines work hours well below the established guidelines. With the smaller airlines, the very operators with the highest accident rate, the guidelines are frequently ignored. Indeed the evidence established that in many cases pilots were required by certain carriers to work hours far beyond the guidelines. As a result, inspectors regarded those operations as unsafe.

In my opinion the evidence clearly established that legislation making mandatory appropriate flight time and flight duty time limitations is now urgently needed, and I do not think that any further study of the matter is at all necessary.

In Volume 2 of my Report I recommended that Canada adapt certain provisions of the Operational FARs promulgated by the Federal Aviation Administration. Those FARs set out in great detail flight time limitations with respect to all crew members. The adaptation of those Operational FARs giving flight time and flight duty time limitations the force of law should now be undertaken. If, for any reason, the adaptation of those FARs should be delayed, then the provision of the information circular, reproduced above, should be given the force of law and be enacted into a regulation.

PART VII

CREW COMPLEMENT

Since the introduction of the use of large commercial jet aircraft, a serious debate has ensued as to the number of crew members necessary to operate such aircraft safely.

It has been the contention of many, led by CALPA, that a three-member crew is necessary if such aircraft are to be operated at the highest level of safety. They contend that automated aircraft systems are less reliable than the manufacturers claim and often increase rather than decrease crew workload. They submitted that the air traffic control service has failed to keep pace with the growth in air traffic and that a third crew member is required to supply an additional pair of eyes to observe and avoid collisions with other aircraft. They also stress the ever-present possibility of pilot or co-pilot incapacitation, as well as other in-flight duties, which compels the requirement of a third crew member.

Those who espouse the two-member crew, which groups include the manufacturers and airline carriers, are equally adamant in their contention that two-member crews can operate modern large commercial jet aircraft as safely as three and rely on accident statistics in support of that contention.

Although it may be contended that pilots view the issue as one of job security, and manufacturers and carriers as one of economics, I am satisfied that in the debate on this issue the pilots had a genuine concern for safety, and the carriers and manufacturers are equally satisfied that a two-member crew does not in any way derogate from the safe operation of the aircraft.

The use of two-member crews in large commercial jet aircraft is not new or unique. But the issue has recently been crystallized by the Federal Aviation Administration certification of the DC-9-80 for operation by a crew of two. As a result of such certification, the President of the United States appointed a Task Force on Crew Complement. The report of the Task Force was issued on July 2, 1981. The issue addressed was summarized as follows:

> "Certification of the DC-9-80 for operation by a crew of two and the debate it has engendered is but another chapter in a controversy that has continued in one form or another throughout most of the last half century. . . .
>
> On one side in the current controversy are ALPA, the Flight Engineers' International Association (FEIA), and some individual pilots and flight engineers. They believe that the air traffic environment, the state and reliability of aviation technology, and the demands that are placed on flight crews require that aircraft such as the DC-9-80 and those planned for service in the near future be flown by a crew of three.
>
> On the other side of the current controversy are aircraft manufacturers, airlines, and other pilots associations and individual pilots. Considering the same basic factors, they believe that operation of the DC-9-80 by a crew of two is at least as safe as operation by a crew of three. Some on this side of the issue believe further that operation of such aircraft as the DC-9 and the B-737 is, and operation of certain future aircraft will be, safer with a crew of two than with a crew of three."
> (Emphasis added.)

The Task Force reviewed five major issues: safety record; air traffic environment; cockpit systems and technology; human factors; and the certification process. In the report the following observations, amongst others, were made:

> "The operation of large commercial jet aircraft by crews of two persons did not begin with the introduction of the DC-9-80; it is not a new or radical departure from past practice in the U.S. domestic air transport industry. Jet transports operated by two-member crews have been in domestic use since the mid-1960s when the DC-9-10 and the British Aircraft Corporation BAC-111 aircraft, both certified for and operated by crews of two, were introduced into service. With the addition of new models and larger aircraft in the DC-9 series and the introducion in the late 1960s of the B-737 (certificated for a minimum crew of two and now operated by two-member crews by all but two of the carriers that operate them), jet aircraft with two-member crews have become a sizable component of the worldwide commercial fleet.
>
> More importantly, and not to imply that there is necessarily a causal connection between these trends, as two-crew member jets have been added to the fleet in ever-increasing numbers, accident rates have declined dramatically. In 1980, two-crew member aircraft accounted for approximately 24 percent of the scheduled airline fleet and 42 percent of the scheduled airline passenger departures. There was not one fatal accident in the more than four million certified-route air carrier passenger operations in the United States that year. . . ."

The authors added this interesting observation:

> ". . . In our conversations with individual pilots, we found that those who are accustomed to flying in three-crew member aircraft tend to doubt that two-crew member operations are as safe. Conversely, pilots who are accustomed to flying in two-crew member aircraft tend to believe that those operations are as safe as three-crew member operations."

With respect to the safety record of United States carriers, the report concluded:

> "Overall, two- and three-crew member aircraft have statistically indistinguishable safety records. It is important to note that this finding is based on more than 14 years of experience during which two-crew member aircraft made more than 19 million departures and accumulated over 17 million hours of flight time. In our judgment, therefore, aircraft flown by crews of two are at least as safe as aircraft flown by crew of three."
> (Emphasis added.)

Other portions of their findings are:

> "Cockpit resource management analysis shows that numerous distractions take place in the cockpit, regardless of crew size. Similarly, pilot incapacitation is an ever-present possibility in the cockpit, but success in dealing with it depends more on pilot training and procedures than on the number of crew members. Accident data do not support the contention that a crew of three provides an extra margin of safety in case of incapacitation.
>
> Although see and avoid is a basic tenet of collision avoidance, the available accident data do not support the contention that the addition of a third crew member contributes significantly to collision avoidance."
> (Emphasis added.)

The Task Force unanimously concluded that:

> "Operation of the DC-9-80 by a crew of two is safe. Adding a third crew member would not be justified in the interest of safety.
>
> FAA's certification of the DC-9-80 for operation by a minimum crew of two was proper and in compliance with the applicable provisions of the Federal Aviation Act of 1958.

As designed, the Boeing 757 and 767 aircraft and the A-310 aircraft being developed by the European consortium, Airbus Industrie, potentially can be operated safely by a crew of two. The addition of a third crew member would not be justified in the interest of safety.

The present process, improved and strengthened as recommended, will ensure proper certification of such aircraft as the Boeing 757 and 767, and proper review of the certification of such foreign-made aircraft as the A-310, from the standpoint of crew complement."
(Emphasis added.)

The Task Force also recommended improvements in the certification process, including the participation of line pilots in the process, and in the evaluation of equipment allowed to be inoperative when the aircraft is dispatched (minimum equipment list). In addition, their other safety related recommendations addressed the following issues which are also germane to this Inquiry:

"1. The aircraft separation assurance program should receive FAA's highest priority, and efforts to improve the ATC system should be adequately and promptly funded. We are encouraged by recent FAA announcements regarding plans for the rapid implementation of collision avoidance systems. As ALPA and others have urged, we recommend that FAA examine the possibility of using the ATC Radar Beacon System (ATCRBS) in the initial implementation of these systems. Positive control of aircraft should be provided in all heavily traveled airspace and major terminal areas at the earliest possible time. Reliever airports and runways should be established in major terminal areas to provide appropriate separation between low-performance aircraft and jet transports.

2. To enhance the effectiveness of the ATC system, we recommend that FAA require all aircraft using heavily traveled airspace to be equipped with at least Mode C (altitude encoding) transponders.

3. Some form of vertical guidance, such as Visual Approach Slope Indicators, should be installed on all runways used by air carriers. Airports served by air carriers should also have instrument landing system (ILS) facilities. ILS and related ground support facilities should be upgraded to keep pace with advances in aircraft capability such as autoland.

4. Local noise abatement procedures in some cases require special flight maneuvers that could compromise safety. We recommend that FAA consider ways of standardizing procedures relating to these maneuvers with safety as the primary concern. Consideration should also be given to exempting newer, quieter aircraft from noise abatement procedures that were designed for older aircraft types.

5. Improvements should be made in the provision of pre-flight weather briefings and timely and accurate in-flight weather information, particularly in terminal areas.

6. Flight crews of whatever size should be relieved of and insulated from demands and distractions that do not relate to flying the aircraft. Some measures, such as prohibiting non-flight-related cockpit conversations and communications during critical phases of flight, have been proposed. Potential distractions can be further reduced through the increased use of single transponder code assignments and automated communications devices, and through the establishment of direct communications links between the ground and passenger-cabin crews to deal with such matters as the personal needs of passengers. We also recommend further reduction of non-essential contacts between the passenger cabin and the cockpit. Cabin crews should be trained to deal with passenger problems and to operate cabin equipment without the assistance of flight crew members.

7. Although the incapacitation of a flight crew member is a rare occurrence, the airlines should uniformly establish programs to train crew members to recognize subtle incapacitation of a fellow crew member and to follow appropriate procedures in the event of such an emergency. We also recommend the further development and use of restraining devices that would prevent an incapacitated crew member from interfering with the flight controls during critical phases of flight.

8. We are impressed with efforts by air carriers to reduce the number of crew-related accidents by improving training in command, leadership, and cockpit resource management skills, and by establishing line-oriented flight training (LOFT) programs. In addition, we recommend that airline pilots serving as second in command also be required to have an FAA airline transport pilot certificate with type ratings for the aircraft on which they serve.

9. Special attention should be directed to concerns expressed by some pilots over what they consider to be an excessively punitive approach by FAA in enforcing safety regulations. We recommend that ways be sought to instill and strengthen a sense of trust and cooperation between FAA and members of flight crews. In particular, we recommend that NASA's Aviation Safety Reporting System (ASRS) be strongly supported by FAA and NASA, and that serious consideration be given to strengthening the immunity provisions applicable to ASRS and to protecting aircrews from unwarranted disclosure of conversations recorded on cockpit voice recorders.

10. Many of the Federal Aviation Regulations (FARs) relating to flight crew responsibilities appear to be unnecessarily complex. An effort should be made to simplify and clarify the FARs to make them more understandable and easier to use.

11. Enroute, terminal area, and approach charts are frequently designed in a way that makes them difficult to use. The design and content of these charts should be improved.

12. The Secretary of Transportation should take steps to expedite the implementation of FAA's program (the Aviation Safety Analysis System Project) to strengthen its ability to collect, process, and disseminate safety-related information necessary for decision-making in FAA and the aviation industry generally. The Aviation Safety Analysis System is being designed to be compatible with other accident data systems, including those maintained by the National Transportation Safety Board (NTSB) and the International Civil Aviation Organization. It is essential that this system include worldwide data.

13. The research conducted by FAA, NASA, and the Department of Defense on the impact of automation on the role of flight crews should be continued and expanded. We also recommend that strong support be given to the development and evaluation of safety-related systems, such as Cockpit Display of Traffic Information and Heads-up Displays, as well as to ongoing research on the effects of fatigue, desynchronosis, and length of duty period on flight crew performance."

COMMENT

I have, of course, had the advantage of studying the very full and detailed report of the Presidential Task Force on Crew Complement, to which reference has been made. Nothing was presented to me which would warrant my arriving at a contrary conclusion. Indeed I am satisfied on all the material which I have read that there is nothing inherently unsafe in the operation of large commercial jets by a two-member crew. The statistical information gathered by the Presidential Task Force fully supports that conclusion, as does the other material upon which they rely. The principles enunciated in that report should be accepted in Canada.

It is to be observed, however, that the conclusion that a two-member crew can safely operate large commercial jet aircraft was accompanied by several other recommendations to improve the overall aviation safety system in the United States. Many of those recommendations were germane to this Inquiry, and I have dealt with many of them in earlier portions of this Report.

PART VIII

AIRCRAFT MAINTENANCE ENGINEERS

An aircraft can be certified as airworthy by an Aircraft Maintenance Engineer (AME) who is licensed by the Department of Transport or, in the case of approved companies, by an unlicensed Aircraft Maintenance Technician who receives authorization from the particular airline which employs him. This topic has been examined in some detail in the Airworthiness Chapter of Volume 2 of this Report.

In Canada, a career in aircraft maintenance engineering can commence along one of the following three training routes available: firstly, association with a non-approved maintenance facility for a three-year period, secondly, training with an approved company, and thirdly, training at an accredited school with subsequent experience during employment.

The qualifications relating to aircraft maintenance engineers are set forth in Volume 2 of the Personnel Licensing Handbook. The aircraft maintenance engineer licence includes a period of validity during which the privileges of the licence may be exercised; the normal renewal period being five years. The AME licence is issued in several categories and may be endorsed for additional categories. These include:

(a) Aeroplanes and Gliders

- (i) Category "A" - certification upon completion of maintenance
- (ii) Category "B" - certification of
  - (a) aeroplanes (excluding engines) and gliders after manufacture, modification, repair or overhaul, and
  - (b) gliders upon completion of maintenance.

(b) Rotorcraft

(i) Category "R" - certification upon completion of maintenance

(ii) Category "B" - certification (excluding engine(s)) after manufacture, modification, repair or overhaul.

(c) Engines

Category "D" - certification after manufacture, modification, repair or overhaul of reciprocating engines, and

(d) Propellers

Category "P" - certification after manufacture, modification, repair or overhaul.

As a contracting state to the International Civil Aviation Organization, Canada's AME licences as issued under Part IV of the Air Regulations are in accord with the standards and recommended practices contained in Annex 1 to the ICAO Convention.

An applicant for an AME licence must successfully complete a written examination and must submit with his application documents and records attesting to the applicant's experience and training. This training may be under the supervision of a licensed AME, through accredited technical schools in Canada, through employment in an aircraft overhaul/repair shop, an engine overhaul/repair shop, a propeller overhaul/repair shop, an aircraft manufacturing plant, through experience in the Canadian Forces, as the holder of an AME licence issued by a contracting state, or as the holder of an AME licence in another category.

The Aircraft Operation Groups, in a brief in the Personnel Phase of the Inquiry, pointed out that there was conflicting legislation regarding the AME privileges:

"In Section 3 of ANO Series IV, no. 1 it is stated that no person shall act as:

> 'Aircraft Maintenance Engineer unless he holds a valid and subsisting licence or permit issued under Part IV of the Air Regulations authorizing him to discharge that function.'

This prohibitive section is clearly in conflict with ANO Series II no. 4 which confers AME privilege to an 'authorized person'."

The Aircraft Operations Group also pointed out that the problems of material retrieval affected maintenance standards in Canada. Standards which do exist are hidden away in various publications, such as the E & I Manual and Aeronautical Engineering Staff Instructions, and are not readily available and retrievable to the personnel concerned. The brief also included the following:

> "Similarly it can be shown that reference material for maintenance training is poorly organized and may be found through various DOT sources in various forms including the Personnel Licensing Handbook Volume 2. There is no published curricula of organized training modules with related apprenticeship training requirement to ensure all candidates meet the same standard."

The Aircraft Operations Group concluded as follows:

> "In summary, the root of the problem may be traced through poorly organized material within existing publications (E and I manual) lack of training modules combining essential knowledge and apprenticeship training, multiple sources of material related to present DOT curricula, the questionable recommending of candidates, the limited number (2) of examinations published in each series making it easy for potential candidates to obtain questions before hand and the apparent lack of regular DOT inspection of maintenance and training facilities including generally overall poor training supervision within the industry.
>
> Recommendations
>
> (1) That a single strong independent personnel licensing authority as envisaged by ICAO Annex 1 remain part of the DOT organization and that encroachment on this area of responsibility by other sections cease.
>
> (2) That the Certificate of Airworthiness Order ANO 11, No. 4, be rewritten to stand alone in a logical, concise format with clear definitions.

(3) That CAIs be trained to spot and report on maintenance deficiencies found during normal check flight duties.

(4) That aircraft maintenance shops supporting commercial operators be inspected on a regular basis by DOT.

(5) That comprehensive course training modules including apprenticeship practical modules be designed using ICAO training manuals where necessary. These modules should be tailored to industry needs and current practice. They must also be flexible and periodically revised to allow for apprenticeship on various equipment and to take account of new equipment.

(6) That the apprentice section of training modules be designed with a control feature to be completed and signed by the AME under whom the experience specified in that module was acquired. That this document be submitted together with the application for license on completion of training.

(7) That all AME applicants be required to complete a formal trade school course for AMEs and satisfactory apprenticeship or complete a DOT curricula containing training modules of knowledge in conjunction with apprenticeship training (military equivalent training should be assessed on merit).

(8) That a strong AME training and standards section specializing in Curricula, examinations and inspection of training organizations be established.

(9) That a computer examination bank of several hundred questions be developed to reduce the candidate's dependency on questions which are known to be easily acquired in the present system."

(Emphasis added.)

One other problem submitted by the Aircraft Operations Group concerns temporary extension of "A" or "R" Category AME privileges:

"It is the practice of most Department of Transport Regional Airworthiness Inspectors to endorse temporary extension of privilege for 'A' and 'R' Category Aircraft Maintenance Engineers (AMEs).

This extended privilege is of a 'one of a kind or one off' basis and includes such items as:

1. Structural welds (particularly helicopters).

2. Initial Radio Installations.

3. Encoding Altimeter Installations.

Although installations and repairs are described as 'one of a kind' in practice, the same mechanic or company may perform them repeatedly on different aircraft.

The practice has developed because of lack of 'B' category engineer service in certain areas and the grey area caused by lack of clear definition of what constitutes a major or minor repair. Some repairs are difficult to classify.

. . .

Recommendations

1. Extension of privilege by 'one of a kind' on the part of airworthiness inspectors cease.

2. Areas of work performed by AME 'A' and 'R' on a frequent 'one of a kind' basis that include structural changes or repairs, should be completed only by a qualified person appropriately authorized either by licencing action or through an approved shop system.

3. Major work be clearly defined so that it will not be performed by unqualified personnel."

The present situation with respect to the alternative sources of training for AMEs was summarized by the Air Transport Association of Canada in the following words:

"At the present time, non-approved companies must employ AME's licenced by the D.O.T. As licencees, they will have received three years practical experience and will have successfully passed written D.O.T. examinations. They may or may not have attended any of the provincial schools listed in Appendix D.

Approved companies conduct their own training. They hire graduates of provincial schools or others with certain academic qualifications. They also hire persons with D.O.T. licences. In all cases new employees must acquire practical experience and pass company examinations before they are certificated by the company to certify aircraft or aeronautical products as airworthy.

Graduates of the schools, which are teaching to the 'Aircraft' and 'Avionics' core curricula, are readily finding employment in both general aviation and the airlines. The numbers of graduates hired by the airlines, compared to off

the street hirings is illustrated in Appendices E and F. It is estimated that, as a minimum, approximately 15% of the off-the-street hirings are, in fact former school graduates.

Major airlines both approved and non-approved have comprehensive initial and recurrent training programs.

. . .

It is expected that the numbers of graduates from 'accredited' schools will increase. The increase in the number of graduates together with the apprentice programs of the larger airlines should result in a lessening of the need for individuals to obtain their D.O.T. AME licence through self study and unstructured on-the-job training. It may well be that at some future date this approach for obtaining the AME licence could be eliminated without causing undue hardship."
(Emphasis added.)

The ATAC brief concisely described the differences between the Canadian system, the American system and the British system:

"In the U.S.A., all aircraft from single engine Cessna to Boeing 747 aircraft are certified airworthy by the holders of an FAA A and P (airframe and power plant) licence. This licence does not provide for type aircraft endorsements. However, the airlines train their personnel on the aircraft type. . . .

In the United Kingdom, personnel who sign the Maintenance Release for aircraft must hold a Civil Aviation Authority (CAA) A and E (aircraft and engine) licence. The holders of this licence are required to have a type aircraft and type power plant endorsement for each aircraft from the single engine Cessna type aircraft and its engine up to air transport type aircraft and their engines by type. Also the CAA makes provision for a 'X' licence to cover aircraft systems and units such as electrical, instruments, and autopilot and compasses.

As can be seen from the above, the Canadian D.O.T. approach to licencing of AME's is mid-way between the very broad FAA approach and the very narrow restrictive U.K. approach which is having an inhibiting effect on aviation in the United Kingdom. Indeed, in the United Kingdom, there has been a move towards the adoption of a system similar to that in effect in Canada. The Canadian D.O.T. approach recognizes the commonality of the small aircraft under 12,500 lbs. and the increasing technological requirements for larger aircraft operated in this country for which AME licence type endorsements are required.

In addition, the Canadian approach accommodates the very complex aircraft which must be maintained and certified airworthy by a 'maintenance system'. It recognizes that when one reaches the stage of large turbine powered aircraft, no one person can be satisfactorily licenced to certify outside of a system. ATAC considers the Canadian approach preferable to both the U.S.A. and U.K. approaches. The Canadian system provides the necessary balance between individual authority and company authority."
(Emphasis added.)

Mr. John E. Bygate, the Aviation Maintenance Coordinator for Confederation College, who teaches in the aircraft maintenance and aircraft maintenance technician courses, submitted a brief on the subject of maintenance training. He submitted in part:

"The licencing of aircraft maintenance personnel is not designed to take into account the advances in technology which have been introduced into light aircraft over the last 15 years.

The very wording on licences appears to emphasize the privilege of the licence and de-emphasize the responsibility of holding the licence.

A significant area in which the total responsibility rests with the A.M.E. and in which he has minimal training is in avionics maintenance.

This area in recent years has expanded so that even the simplest aircraft used by the general aviation operator can have a reasonably complex avionics package consisting of radio Nav, Com, A.D.F. and transponder. If we add a second A.D.F., A.D.M.E. and a second communications radio, we have a complex package which requires some on aircraft maintenance and adjustment.

The average A.M.E. has been conditioned that the method of solving avionics problems is to remove a black box and replace it with a new unit.

At best this is a shotgun approach to troubleshooting but does not take into account the numerous occasions when the fault lies in the installation which is hard wired into the aircraft or the equally numerous occasions when the total system requires some on aircraft adjustment or alignment.

At this time the services of an avionics technician are usually required.

From this point on the A.M.E. is now responsible for areas where he has no direct control or indeed experience.

His signature after completion of this work by someone from another area of expertise makes him totally responsible for whatever the expert help does to that aircraft for better or worse.

This is similar to a general practioner taking full responsibility for the outcome of brain surgery carried out by a specialist under consultation." (Emphasis added.)

He noted that Air Canada employs 300 avionics technicians to look after 120 to 140 aircraft whereas many of the 20,000 general aviation aircraft have never been seen by an avionics technician.

Mr. Bygate complained that an AME could pass the theoretical examination without demonstrating practical expertise. The Department made this reply to his evidence:

> "It has been suggested that DOT either administer a practical test of a candidate's aircraft maintenance skills prior to writing the required written examination, or delegate that task to an educational institute.
>
> It is presently not possible to write the papers required for the AME licence without providing evidence of practical experience.
>
> This suggestion is not considered practicable on a national scale, due to lack of skilled DOT staff to give the tests. Furthermore, it is difficult to devise a single test to be performed in a reasonable time which would assess the student's practical ability acquired over a three year period. This is why the present requirement specifies that an AME must certify that the student has demonstrated his skills in a number of practical areas relating to maintenance."

A particular problem as regards renewal of AME licences was disclosed in a letter from Mr. G. R. Gagne, Acting Superintendent, Personnel Licensing Standards, on November 28, 1977 wherein he stated:

> "AME Standards
>
> We refer to your request for clarification of standards for renewal of AME Licences.
>
> This matter is dealt with in the following articles of ICAO, Annex 1:
>
> > '1.2.5.1 A Contracting State, having issued a licence, shall ensure that the privileges granted by that licence or related ratings are not exercised, unless the holder maintains competency and meets the requirements for recent experience established by the state;'

'4.1.2.2 The privileges of the holder of an Aircraft Maintenance Type II Licence in 4.1.2.1 shall be exercised only:

(a), (b), (c) and (d) (are not relevant)
(e) on condition, that within the preceding 24 months either he has exercised the appropriate privileges of the holder of an Air Maintenance Type II Licence for not less than six months or he has satisfied the Licensing Authority of his ability to meet the standards prescribed for the issue of a licence with appropriate privileges;' and

'4.2.2.2' (Is a repetition of 4.1.2.2 except that it deals with AME Type I Licence).

Article 1.2.5.1 establishes two standards:

1. maintenance of competency, and

2. recent experience.

Articles 4.1.2.2 and 4.2.2.2 prescribe standards for recent experience.

Although ICAO grants much leeway to the Contracting State in establishing renewal standards for AME Licences, nevertheless, it calls for competency and recent experience. Firstly, Canadian AMEs are not required at present, nor have they been for quite some time in the past, to show their competency. Secondly, the extension of the renewal period from 3 to 5 years enhances the possibility of AMEs exercising their privileges without recent experience.

It is our contention that Canadian standards for the renewal of AME Licences appear to be at present loose and indulgent, if any exist at all.

Hence, we recommend that the following procedures be instituted to restore acceptable standards for the renewal of AME Licences:

1. that AMEs be required to certify on Form 26-0029, Application for Renewal of AME Licences, that they have exercised AME privilege for not less than six months in the last 24 months preceding the submission date of the application for renewal of the licence; and

2. that the chief engineer of the organization for which the AME works certify his competency on form 26-0029; or

3. that AMEs who are self employed or working independently be required to write a comprehensive open book examination which would be prepared and supplied by Transport Canada."

(Emphasis added.)

Mr. William A. Born, an Airworthiness Inspector, testified with respect to certain problems of the work carried out by AMEs in non-approved facilities as follows:

"A ... I have, in my work, visited several companies who are not an approved company who overhaul aero-engines, as an example, and one in particular was working out of a barn who had almost no lighting. He required the barn doors to be opened so that he had sufficient lighting. He had non-destructive testing equipment which he purchased second-hand some seven years ago and never had it serviced. He did not even know how to operate it.

I brought him a defective piston pin and I asked him if he could determine whether that part was good or bad. It took him a half an hour by all sorts of means of trying to magnetize that part, trying to put in through - he just couldn't operate it. He didn't know how to magnetize it. Eventually he gave up. Although his job consists of, every time he has to overhaul an engine, he has to magnetic inspection these parts and he certifies that they're free of cracks. If he doesn't know how to operate it, the engines that he produces could have cracks.

Q So, under the present system, just the fact that he has an AME licence, it doesn't matter whether he has the equipment, whether it works, whether he knows how to use it, he's free to set up shop as an overhaul facility.

A Right, the authorization that he has, he's authorized to certify airworthy after overhual. So, he overhauls it, so, he certifies it.

...

Q What type of action was taken as a result of this, what difficulties do you have in getting these type of people out of the market?

A We try to remove his licence, but under the Air Regulations we can only remove his licence if we show that he is incompetent and we succeeded in having his licence revoked. However, he immediately applied for a re-examination and he went through the DOT exam and he passed and he got his licence back and he's back in operation again.

...

Q Well, can't we rely on, say, the consumer, the person that is taking his engines to be overhauled to ensure that he's taking it to a person that has adequate equipment, or do you see the problem being that if someone has an AME, we all assume that he's going to be doing the best possible?

A Well, usually what happens is if an approved company has an overhead and he would probably charge a little bit more, whereas, a private aircraft owner who has a Cessna 150 and needs his engine to be overhauled and he's short on funds, he will go to whoever will charge the less and an AME working out of his garage or basement, he can charge less. The aircraft owner doesn't really realize that perhaps he's not getting a reliable engine. I have heard of several engines that failed shortly after overhaul. Right now we're in the midst of investigating an engine that overhauled that failed after 18 minutes of flight time after overhaul, the connecting rods came apart.

. . .

A . . . I have inspected another facility, also non-approved facilities, and an aircraft certified, dual inspection carried out by two AMEs and signed out as such where they forgot to install a pulley. And the cable was starting to rip the wing and it would have failed eventually.

We tried to make a case out of it, we wrote a letter to the AME signing the aircraft out saying, can you give some explanation? The explanation we got was, oh, when we inspected it was there, somebody else must have removed it after."
(Emphasis added.)

COMMENT

While I agree with ATAC that the Canadian approach to licensing of AMEs tends to provide a useful balance between the American and United Kingdom systems, it is clear from the evidence which was presented before the Commission that certain system changes would enhance the effectiveness of the aircraft maintenance engineer in the overall aviation safety system.

The long-term solution to AME training should foresee the eventual elimination of the unstructured on-the-job training and its replacement by formal school training. This could be achieved by initially requiring a shorter formal trade school course complemented by on-the-job training, and a schedule whereby, over a period of years, the formal school training program would be increased so that in a short time the obtaining of an AME licence through self-study and on-the-job training would become unacceptable for licensing purposes.

I agree with Mr. Bygate when he pointed out that a significant area in which the total responsibility rests with the AME and in which he has minimal training is in avionics

maintenance. In recent years, with the development of modern jet aircraft and sophisticated technical equipment, the entire airworthiness field has become technical and specialized. The electronic and communications systems, generally called avionics, are a relatively new field and require special training, knowledge and experience. Under the present licensing system in Canada, aircraft maintenance engineers dealing with avionics hold no special accreditation. I am therefore of the opinion that Transport Canada should designate avionics as a separate field for licensing or accreditation purposes.

I am also of the opinion that in order for an aircraft maintenance engineer to be entitled to an automatic renewal of his licence, he should have exercised his AME privileges for a period of not less than six months of the last 24 months preceding the date of the application for renewal, failing which a new application for a licence should have to be made.

I am further of the opinion that aircraft maintenance shops servicing commercial operators should be inspected on a regular basis by the Department of Transport in order to ensure that AME standards, as established by the Department, are being maintained.

PART IX

AIR TRAFFIC CONTROLLERS

I have already discussed the vital role that air traffic controllers play in the aviation safety system. As is the case of pilots and aircraft maintenance engineers, air traffic controllers are also licensed pursuant to the provisions of the Aeronautics Act, but, unlike the other two categories, they are all employed by Transport Canada.

As employees of Transport Canada, they are represented for Collective Bargaining purposes by the Canadian Air Traffic Control Association, Inc. (CATCA), and their employer-employee relationship is governed by a Collective Agreement. This has resulted in a perceived conflict between the right and duty of the Minister of Transport pursuant to the Air Regulations to suspend the licence of an air traffic controller in an appropriate case and the provisions in the Collective Agreement between CATCA and the Government of Canada with respect to the role of Fact Finding Boards, and the consequences which flow from disciplinary action.

FACT FINDING BOARDS

The Fact Finding Board process was established by the Department of Transport in 1975 to provide for the voluntary reporting by air traffic controllers of losses of separation and operating irregularities. Section 2241.1 of the Air Traffic Control Manual of Operations (MANOPS) requires air traffic controllers to "Report to the unit chief as soon as practicable, any incident that may require investigation". The Collective Agreement entered into between the Canadian Air Traffic Control Association, Inc. and the Treasury Board on behalf of the Government of Canada provides in part as follows:

> "6.09 The parties agree that audio or visual tape recordings and transcripts of ATS communications are intended to provide a record of such communications for use in the monitoring of ATS operations and the investigation of operating irregularities, infractions, incidents or accidents. The parties further agree that audio or visual tape recordings and transcripts of ATS communications are not normally intended to provide direct evidence before third parties in disciplinary cases, or incompetency cases under Section 31 of the Public Service Employment Act. It is further agreed that if they are to be used in such cases, a review of the recording or transcripts will

be made by a senior official of the Employer and the Association, and following such review, there must be mutual consent of these officials to introduce such recordings or transcripts as direct evidence.

6.10 Where an operating irregularity occurs that could be the subject of a Fact-Finding Board investigation, and where the circumstances that gave rise to the operating irregularity are not as a result of wilful misconduct or gross negligence on the part of an air traffic controller, and where as a result of that operating irregularity the employee's air traffic control licence is suspended, excluding suspensions of the licence validation certificate, by a regulatory agency of the Employer, then the employee will suffer no loss of his normal pay during such period of licence suspension while performing other assigned duties."
(Emphasis added.)

Thus the Fact Finding Board process seeks to establish an incident reporting and investigation system that offers a form of disciplinary immunity to the concerned air traffic controller. In this way, air traffic controllers are encouraged to report losses of separation and other operating irregularities, and this in turn permits the Air Traffic Services Division of Transport Canada to identify and remedy operational deficiencies and in some instances re-train the air traffic controller. The objective of the Fact Finding Board is to prevent recurrence of similar irregularities.

As I have already noted, a loss of separation is an occurrence in which less than the authorized separation minimum between aircraft exists. Separation minimum is defined by the Air Traffic Control Manual of Operations as "A statement of the least allowable amount of lateral, longitudinal, or vertical separation to be applied". A technical loss of separation is defined by the MANOPS as "an occurrence in which less than the authorized separation minimum existed but no evasive action was considered necessary by the aircraft or controller".

It is to be noted that the Canadian Air Traffic Control Association, Inc. not only supports the Fact Finding Board process, which implies the removal from operational duty of an air traffic controller, without prejudice, pending the investigation of an incident, but indeed they recommended that this removal from operational duty should be standard procedure for all holders of civil aviation licences who are involved in an incident. At the present time, no other Transport Canada employee group has a similar arrangement. Obviously, however, an air carrier does have the discretion to ground one of its pilots

after an incident if the carrier feels an investigation is warranted. It is further to be noted that for an air traffic controller, suspension from duty is equivalent to a licence suspension because Transport Canada is the only employer of air traffic controllers. There was evidence to the effect that the removal of punitive disciplinary action for an incident has in fact increased the number of reported incidents since 1975, which has permitted the Department to more thoroughly analyse safety system problems.

If a loss of separation is reported by the controller, his supervisor conducts a preliminary investigation to ascertain whether or not a loss of separation or irregularity did in fact occur. The controller is removed from duty, and if there were an irregularity, the headquarter's branch of Air Traffic Services as well as the Regional Manager of Air Traffic Services are advised of the situation. The air traffic control unit subsequently prepares a transcript of the air-ground conversations. The Fact Finding Board is composed of a headquarter's chairman, a unit chief from a unit other than the unit concerned and an operational controller from the unit concerned. The Fact Finding Board interviews controllers and reviews the transcripts. CATCA is advised at the local level, and the controller concerned can be represented before the Board. The Board then drafts its report in which it outlines the sequence of events, findings and conclusions. The recommendations are drafted separately and form a separate document. The report itself is sent to the Director of Air Traffic Services, the Director General of Civil Aviation, the Director of the Aviation Safety Board, the National Office of the Canadian Air Traffic Control Association, Inc., the Regional Manager of Air Traffic Services, the Regional Controller of Civil Aviation, the unit chiefs and the controller involved. The recommendations are sent to the Director General of Civil Aviation as well as the Director of Air Traffic Services.

The air traffic controller holds his civil aviation licence pursuant to the Air Regulations. His competency is assessed by Air Traffic Services pursuant to the Personnel Licencing Handbook and the Inspection Instructions.

In its public hearings, the Commission had the opportunity to study a number of incidents which were subjected to the Fact Finding Board process. Some of these incidents demonstrated that the Fact Finding Board process was not always as useful as some

claimed. In some cases, a number of witnesses expressed concern that the Fact Finding Board process was a hindrance to the enforcement process.

On June 18, 1980 an alleged operating irregularity took place approximately 35 miles northeast of Montreal in which a pilot of a 747 aircraft claimed that his aircraft had had a near-miss with a Cessna.

A Fact Finding Board was convened and the Board's report, under the section "Findings", contained the following paragraph:

> "The Board was unable to interview the Terminal Supervisor who was on sick leave and annual leave until July 24. The Departure controller was also unavailable whereas he was on compensatory/sick leave and days off until June 28. The Data controller was on midnight shifts and advised the Unit that he was unable to meet with the Board after his shift was completed. The Board Chairman therefore met with the Data controller during the late shift to discuss the occurrence."
> (Emphasis added.)

The conclusions of the Fact Finding Board's report were:

> "1. The Board was unable to determine if a loss of separation did or did not occur. Statements received from Controller (name withheld) and BA 75 contradict, in that the controller maintained there was required lateral separation (3 miles), while BA 75 has indicated that vertical separation did not exist and the aircraft passed in close proximity.
>
> 2. Flight safety, in this instance, could have been jeopardised had the Arrival controller not taken action when it was realized that BA 75 would cross the localizer.
>
> 3. The investigation of this operating irregularity was impaired due to the non-availability of required personnel to provide information to the Board."
>
> (Emphasis added.)

It is to be noted that the objective of the Fact Finding Board was stated:

> "To determine if a loss of separation or a hazardous situation did occur; to establish the cause of any confirmed loss of separation or hazardous situation; to identify errors and deficiencies within the system; and to recommend corrective measures."
> (Emphasis added.)

Mr. Laurent Chartier, the Quebec Regional Controller of Civil Aviation, was highly critical of the report, pointing out that it was conducted in a non-professional fashion, failed to establish if a loss of separation or a hazardous situation did occur, and did nothing to advance aviation safety.

The inability to determine whether or not a loss of separation had occurred, and the consequent inability to bring forward necessary recommendations were not caused by any of the inherent facts of the case, but rather by the mere fact that the Board members did not speak to the concerned personnel who happened to be away on sick, annual, or compensatory leave.

The Director of Air Traffic Services decided to reopen the case. The departure controller was subsequently interviewed. However, after this interview, the Board decided that it would not alter nor change the findings of the report.

AN ADMINISTRATIVE INQUIRY

Air Regulation 407 provides:

> "The Minister may cancel or suspend a licence, permit, certificate or other document of authorization issued to any person under this Part where the Minister
>
> (a) on reasonable grounds, believes that such person has violated any provision of these Regulations or any order or direction made pursuant to these Regulations; or
>
> (b) is of the opinion that such person is incompetent or physically unfit to exercise the rights and privileges thereunder."

One particular case in the Quebec Region, highlighted most, if not all, of the problems associated with the perceived conflict between the Fact Finding Board process and an Administrative Inquiry.

On February 26, 1980, two DOT inspectors on a DOT aircraft were given authorization to take off by an air traffic controller at Dorval Tower on Runway 28. At the same time a ground controller also situated in the Dorval Tower gave clearance to an Air Canada

DC-8 to cross the same runway. At the last moment the DOT pilot suddenly saw the DC-8 cross the runway in front of him and he shut off his engines. A Fact Finding Board was convened and reported that the cause of the incident was for "undetermined reasons". Mr. Laurent Chartier, forcefully criticized the report and cited the incident as an example where the Regional Controller of Civil Aviation was powerless to take disciplinary action. He was of the opinion that the error could have been caused by simple negligence, but that it would have been impossible to absolutely determine the cause of the error until after an Administrative Inquiry was convened to look into the matter.

Dissatisfied with the Fact Finding Board Report, and suspecting controller incompetency that could affect air safety, Mr. Chartier decided to initiate an Administrative Inquiry.

He was aware of a telegram from Mr. Arpin, Director General of Civil Aeronautics, to all regions dated March 21, 1979 which stated in part:

> "AN AIR TRAFFIC CONTROLLER'S LICENCE MAY ONLY BE SUSPENDED FOR NEGLIGENCE OR INCOMPETENCE. <u>THE ESTABLISHMENT OF INCOMPETENCE SHALL BE DETERMINED BY THE RMATS (REGIONAL MANAGER OF AIR TRAFFIC SERVICES) AND LICENCE SUSPENSION ACTION IS UNNECESSARY SINCE THE CONTROLLER WILL NORMALLY BE SUSPENDED AT THE TIME OF AN IRREGULARITY AND WILL ONLY BE RE-CERTIFIED AFTER HE DEMONSTRATES HIS COMPETENCY. THIS HAS BEEN CATA POLICY FOR SEVERAL YEARS</u>. HOWEVER, SHOULD THE RMATS DETERMINE THAT THE INDIVIDUAL CANNOT BE RE-CERTIFIED THEN HE SHALL RECOMMEND TO THE RA (REGIONAL ADMINISTRATOR) THAT AN ADMINISTRATIVE INQUIRY BE CONDUCTED BY THE RCCA (REGIONAL CONTROLLER OF CIVIL AVIATION), WHICH COULD LEAD TO LICENCE SUSPENSION. THE ESTABLISHMENT OF NEGLIGENCE SHALL ALSO BE DETERMINED BY AN ADMINISTRATIVE INQUIRY WHICH MAY BE RECOMMENDED BY THE RCCA AND SUPPORTED BY THE RMATS. . . ."
> (Emphasis added.)

Mr. Chartier was thus aware that before he could convene an Administrative Inquiry he needed the approval of the Regional Manager of Air Traffic Services. In the abovementioned case, the RMATS did in fact support the convening of an Administrative Inquiry.

However, before Mr. Chartier could convene his inquiry, he received instructions from the Deputy Administrator which stated in part that "If an Administrative Inquiry is essential, it must address the operating procedures and not the individual controller".

As a result, Mr. Chartier abandoned all hope of convening an Administrative Inquiry. Furthermore, Mr. Chartier's request to have the Fact Finding Board reconvene was refused by Headquarters on the grounds that the report was satisfactory.

In reply to Mr. Chartier's testimony, Mr. P. Arpin testified that he personally could not understand why Mr. Chartier felt that he could not hold an Administrative Inquiry if it had been jointly requested by Mr. Chartier and the RMATS. The Administrator stated that in his opinion the Regional Controllers of Civil Aviation were in no way confused about the Fact Finding Board process, but felt they were testing the procedure since they did not agree with it. He did agree that the Deputy Administrator's instructions were confusing, if not erroneous.

COMMENT

I am of the opinion that the confusion that has arisen as to the perceived conflict between the Fact Finding Board process and the Administrative Inquiry process is because of the failure to have distinguished between the two roles played by Transport Canada in its dealings with air traffic controllers.

On the one hand, Transport Canada is the employer of air traffic controllers and the provider of air traffic services to the Canadian aviation community. In the Fact Finding Board process, Transport Canada assumes its role as an employer. The training of an air traffic controller necessitates a considerable investment in time and resources, and there is considerable merit, from an employer-employee point of view, in the approach that whenever possible the retraining of an incompetent air traffic controller is more productive than alternative forms of disciplinary action. As an employer, the Government of Canada is free to provide, by Collective Agreement or otherwise, that any air traffic controller whose licence has been suspended by the Licensing Authority shall continue to receive full pay except in cases of gross negligence. The Fact Finding Board does not assume any disciplinary or licensing role. Its sole function should be directed to

remedying any deficiencies in the aviation safety system. Thus viewed, it is not inappropriate for the Fact Finding Board to be composed solely of air traffic controllers or their managers. The Fact Finding Board process which has the full support of the Administrator, has, on the whole, contributed much to the aviation safety system.

On the other hand, pursuant to section 407 of the Air Regulations, the Minister has the authority and duty to cancel or suspend an air traffic controller's licence if the Minister, on reasonable grounds, believes that such person has violated any provision of the Air Regulations or any order or direction made pursuant to those Regulations, or where the Minister is of the opinion that such person is incompetent or physically unfit to exercise the rights and privileges thereunder.

The purpose of an Administrative Inquiry is to determine whether such conditions have been met. In the event that the Administrative Inquiry results in the ministerial action of a cancellation or suspension of a licence, the aggrieved party should have the right to appeal to a Civil Aviation Appeal Tribunal, the establishment of which I recommended in Volume 2 of this Report.

As I have noted, the confusion that exists on this subject has arisen because of the failure to have distinguished between the respective functions of a Fact Finding Board and of an Administrative Inquiry. This has been engendered by reason of a series of unclear and contradictory instructions from Headquarters. I have previously referred to these, and, in particular, to the suggestion that the Regional Controller, Civil Aviation, cannot initiate an Administrative Inquiry without first having obtained the approval of the Regional Manager of Air Traffic Services. In my opinion, if the Regional Controller of Civil Aviation determines that it is appropriate to embark upon an Administrative Inquiry with respect to an air traffic controller, he should be free to do so and should not have to first obtain the approval of the Regional Manager of Air Traffic Services.

The impression that has been left that air traffic controllers are beyond the reach of the Minister's authority and duty to cancel or suspend an air traffic controller's licence has had an unsettling effect. Furthermore, as I understand the evidence, the Canadian Air Traffic Control Association, Inc. did not take issue with the proposition that air traffic

controllers, like all other licensees, are subject to the ministerial action provided for by section 407 of the Air Regulations.

In Volume 2, I recommended the creation of an Enforcement Branch. In keeping with that recommendation, the new Regional Director of Enforcement should also have the right to initiate an Administrative Inquiry.

PART X

AIRPORT EMERGENCY PERSONNEL

A document entitled "Transport Canada Airport Emergency Services" (AES) outlines its objectives in the following language:

> "The primary objective of the Airport Emergency Services (AES) is to save lives in the event of an aircraft accident/incident or fire at an airport. This will be accomplished by providing a fire-free escape route for the safe evacuation or rescue of passengers and crew. A secondary objective is to preserve the property involved by containing or extinguishing, where practical, any fire resulting from an aircraft accident or incident.
>
> INTERPRETATION: Specifically, the AES will normally be the first to arrive at the scene of an aircraft emergency. Upon their arrival, action will be taken to prevent, control, or extinguish fire involving or adjacent to an aircraft, for the purpose of providing fuselage integrity and an escape area for its occupants. Such efforts shall be under the direction of the senior AES officer present.
>
> The AES will participate, to the extent possible, within their available resources, with the flight crew in the evacuation of passengers. If the flight crew are unable, for whatever reason, to open usable emergency exits, AES personnel will, by whatever means necessary, force entry to the aircraft and provide assistance in the evacuation/rescue of the occupants.
>
> Airline operators will develop an organization and procedures that will place their ground personnel on the emergency scene as quickly as possible for the purpose of undertaking responsibilities that fall within their jurisdiction."
> (Emphasis added.)

The history of the development of the Airport Emergency Services is set forth in the Executive Summary of a document entitled "Airport Emergency Services (AES) Evaluation - July, 1977":

> "'. . . In December 1944, a Canadian delegation to ICAO signed an agreement to participate with other countries in the establishment of standards and guidelines for International Aviation. The Airport Emergency Services was formally created within the Department of Transport in 1960. The service and standards adopted by Canada were greatly influenced by the guidelines established by ICAO, but instead of ten airports categories, AES grouped Canadian airports into eight categories, according to the weight and fre-

quency of the critical aircraft operating on a regular, scheduled basis at the airport.

In June 1972, the Canadian representatives to ICAO's second meeting of the Rescue and Firefighting Panel received the onerous task of chairing the session. The new standards that were proposed at this meeting formed the basis of the subsequent work of a Multi-Directorate Committee at Transport to update and revise existing Canadian standards. The work of the Multi-Directorate Committee culminated in a set of proposals in February 1975, recommending the updating of the Canadian Standards to the levels approximating those recommended by ICAO.

These proposed new standards classify airports into nine (9) alphabetic categories, based on the size (length) of the aircraft using the airport on a regular, scheduled basis, and then further classify them into three (3) subcategories allowing for differences in the frequency of aircraft movements (See Figure 1, page 22). AATA at the CATA Senior Management Committee meeting of 24 February 1976 stated that the proposed new standards should be accepted, but their implementation was left to be subject to a priority listing of airports requiring upgrading. The proposed new standards required the increase of manpower from 795 to 956 and the addition of 37 vehicles phased over a five-year period. In August 1976, the AES manpower (as of 16 August 1976), was 768. The most recent information (July 1977) indicates that 117 additional personnel and 76 new vehicles are required.'

As of July 1, 1980, that situation had not materially changed. There has been some improvement in the equipment at larger airports. However, under the new AES standards, there will actually be a reduction in both manpower and vehicles at several of the larger Canadian airports."
(Emphasis added.)

The fire fighters are represented, for Collective Bargaining purposes, by the Public Service Alliance of Canada. In its brief on the subject of airport emergency services, the Public Service Alliance of Canada made the following comment with respect to the above-stated objectives:

> "While this new wording goes a long way towards solving the issue of responsibility for rescue of passengers and crew, it is still fudging. When Transport puts in the saving clause 'within their available resources', with the reduction to one man per truck and the actual reduction in the size of the firefighter crews at the major airports, not very many resources are available."

The Public Service Alliance also submitted that:

> "Firefighting is a profession - not something to be carried out in a haphazard manner by untrained personnel.
>
> Yet, by increasing the use of so-called auxiliary firefighters at airports (Timmins as an example), Transport Canada can reduce the size of the professional firefighter crews at many airports."

The Public Service Alliance was critical of what they claimed to be equipment deficiencies for AES operations as well as of the fact that many airports are designated as alternate sites when another airport may be closed and such alternate sites may not have sufficient firefighting personnel and/or equipment. They would have alternate airports serviced by personnel and/or equipment comparable to that which is provided for at the airport of original destination.

The position of Transport Canada was explained by Marina Mary Robillard, who holds the position of Director of Airport Services and Security. In that capacity she is the person responsible for the development and promulgation of policy, standards and guidelines, related to the services provided at airports, including emergency services, policing and security services and passenger services within the terminal buildings and ground site facilities.

Ms. Robillard explained the final development of the AES standards:

> "In May 1980 we then consulted again with ATAC, with IATA, with CALPA and UCTE, and although there were some opposition, in fact a lot of opposition to many aspects of the standard, we adopted some of the recommendations made by some of the unions, but we felt that because of vested interests, it was soon realized that complete agreement would not be possible. But efforts were made to reduce the number of issues and minimize the significance of those remaining."

Basically, Ms. Robillard pointed out that Canada's standards closely represent the standards recommended by ICAO. Ms. Robillard stated:

> ". . . <u>My feeling is that we have come a long way to in fact enhance the level of protection at all airports across the country</u>,
>
> . . .

I would like to add that, contrary to much ado about the number of reductions that are taking place at different airports, we did recognize that we were deficient at some airports and, indeed, we have now gone to senior management and we are going to Treasury Board for an increase in some 89 person years, of which 84 are firefighters, and 74 pieces of new equipment to the tune of some $46 million. We have not received approval yet but we are seeking it at this time."
(Emphasis added.)

Furthermore, the Commission was assured that Canada would continue to meet ICAO's standards in the future when Ms. Robillard stated:

"Well I think that I can answer that question by stating that I have raised this question with my senior management in Transport Canada, and if ICAO do decide to change the standards and the categories, and we have now undertaken to meet the ICAO standards, that we would certainly support it and change our standards accordingly."
(Emphasis added.)

Some questions were raised as to the exact responsibilities of various parties in the event of a crash. In preparing some earlier drafts of the proposed standards, the wording may have led a reader to believe that the firefighter's responsibility was limited to opening a path to the aircraft and would not include any participation in the evacuation of the occupants. The Department has made it clear that at no time did they expect air carriers to take part in assisting passengers and crew to escape from the aircraft or with the actual extricating of passengers and crew from a crashed aircraft. The new standards clearly point out that the AES will assist the flight crew in the role of passenger evacuation. However, it is not the AES responsibility to care for the injured after they have arrived at a safe distance from the accident site.

Caring for injured passengers or crew after they have arrived at a safe distance from the accident site is the responsibility of those designated in the airport contingency plan. Ms. Robillard explained:

"Sir, the airport contingency plan or the airport emergency plan, emergency procedures and so on, that is where the role of the carrier comes in and that's what I had explained earlier."

The earlier testimony to which she refers, included the following:

> "The carriers, we have an agreement with all of the carriers at the airports along with the fire departments, the doctors, hospitals, police, management and others, that whenever there is a crash that occurs at the airport that all of them are involved in some way to assist
>
> . . .
>
> Well, what happens is that we agree with the carriers, and this is set out in writing and reviewed on an annual basis as to their role whenever a crash occurs at the airports. . . ."
> (Emphasis added.)

According to Ms. Robillard, the responsibility of carriers is established in the new aircraft crash fire protection standards to which I have previously referred, and more particularly in the following extract from the stated objective in those standards:

> "Airline operators will develop an organization and procedures that will place their ground personnel on the emergency scene as quickly as possible for the purpose of undertaking responsibilities that fall within their jurisdiction."

Mr. George C. Capern, on behalf of the Air Transport Association of Canada, was questioned about this clause:

> "MR. COMMISSIONER: . . . What responsibilities do the airline carriers accept is within their jurisdiction on emergency . . on aircraft crash fire protection standards?
>
> MR. CAPERN: At the minute, sir, we accept none.
>
> . . .
>
> MR. COMMISSIONER: This clause, as far as you're concerned, is meaningless?
>
> MR. CAPERN: Exactly.
>
> MR. COMMISSIONER: Because you don't have jurisdiction?
>
> MR. CAPERN: No Sir."

COMMENT

The emergency services personnel are an integral part of the overall aviation safety system, and I was impressed with the evidence presented to me as to their great skill and efficiency.

Emergency services and firefighting can only be utilized in the event of a crash or accident on the runway or in the immediate terminal vicinity of an airport. Because there is a limit to the funds available, criteria must be established to determine how the equipment and personnel allocated for emergency services can best be utilized. It would be quite impractical to require that every airport in Canada which may be used as an alternate landing site should have equipment and personnel comparable to that which is provided at the airport of original destination, or that all airports should be required to have the same equipment and personnel as is presently provided for at our largest and busiest airports.

I am satisfied that in agreeing to follow ICAO's standards and practices as they are being evolved, Transport Canada is doing all that can reasonably be expected of it in providing adequate airport emergency personnel and equipment and is presently providing an adequate level of service.

I was impressed with the evidence of Ms. Robillard, with her grasp of the issues and her determination to see that the emergency services and personnel at airports in Canada are maintained to the highest standards which present resources would permit.

One issue, however, did arise which appears to require an immediate resolution. As I have noted, the policy statement of Transport Canada Airport Emergency Services notes in part:

> "Airline operators will develop an organization and procedures that will place their ground personnel on the emergency scene as quickly as possible for the purpose of undertaking responsibilities that fall within their jurisdiction."

Ms. Robillard appeared to have understood that an agreement as contemplated by the above statement had been entered into with the airlines. Mr. Capern, on behalf of the

major airline operators, very frankly stated that no such agreement had been entered into because the jurisdiction contemplated was not clearly provided for.

Although Transport Canada assumes the responsibility for the opening of a path to the aircraft which is the subject of the emergency and for the making of every effort to assist passengers and crew to escape from such aircraft, the responsibility for the care of those passengers or crew who have been removed from the aircraft to a safe distance from the accident scene has not yet been fully delineated. Such an issue requires immediate resolution, and, in my opinion, under such circumstances the airline carriers should be fixed with a duty of providing some requisite services and assistance to such passengers or crew, when the emergency concerns an aircraft of an air carrier. Transport Canada should seek to enter into an agreement with the carriers, which agreement should set out the responsibilities of the carriers in emergencies. Should it not be possible to enter into such an agreement, Transport Canada should determine these responsibilities and establish the requisite services that carriers should provide. Furthermore, Transport Canada should determine similar responsibilities for emergencies which do not concern air carriers.

PART XI

UNLICENSED PERSONNEL

There are thousands of personnel who play a significant role in the aviation safety system who are unlicensed by Transport Canada. This is in keeping with ICAO recommendations and with the practice in most countries which have significant aviation activity.

Most unlicensed personnel are employed in private enterprise. Many of them through their Associations submitted that they should be licensed by Transport Canada. Their principal contention was that if they were licensed, they would be able to play a greater role in the aviation safety system. They also contended that their employers often have a conflict of interest between taking action required in the interests of aviation safety and the economic impact that such action would entail. The unlicensed personnel feel that their role in aviation safety matters would be better understood and their status increased if they were licensed, and thus had a statutory duty to act in the interests of safety. They feel that, if licensed, they would be able to seek improvements in aviation safety matters with greater authority.

Many such groups appeared before the Commission, and I have selected two of them to illustrate the contentions of the unlicensed personnel and the responses to their submissions, which are illustrative of the overall issue.

FLIGHT DISPATCHERS

Flight dispatchers are employed by major airline carriers and for Collective Bargaining purposes are represented by the Canadian Air Line Dispatchers Association (CALDA). A brief description of the role of the flight dispatchers as well as the position adopted by CALDA on licensing appears from the following extract from their brief:

> "BACKGROUND
>
> To understand the flight dispatcher's job, it is necessary to go back nearly half a century. In the 1930's progress began to catch up with the airlines as

new and faster aircraft were designed. Air travel became increasingly popular, airways became more crowded and flying was less safe. In the late 1930's a series of fatal accidents called attention to the need for safety regulations and their enforcement. A survey revealed that it was 53 times as dangerous to fly as to ride in a pullman car, 38 times as dangerous as a day coach, and 8 times more hazardous than riding in your own automobile.

The United States Civil Aeronautics Act of 1938 was that government's first serious effort to deal with industry regulation, and it was this Act that made licensed aircraft dispatchers required personnel for all commercial airlines in the United States. The use of the flight operations officer/flight dispatcher in civil aviation became a requirement throughout the world.

In 1970 the PEL/TRG/MED Divisional Meeting of I.C.A.O. decided that in view of the increasing use of the flight operations officer, the time had come to upgrade his license from a Recommended Practice to a Standard. This motion was moved by Canada. Most of the Contracting States of I.C.A.O. now use the flight operations officer in their system of Flight Supervision and a substantial number (68) have advised I.C.A.O. that they have no differences with respect to the flight operations officer's license. The use of, and the licensing of the flight operations officer, has at least tripled since 1970.

Numerous meetings have been held between Transport Canada and the Canadian Air Line Dispatchers Association on the subject of licensing of the flight dispatcher and the lack of regulations concerning operational control and the subsequent lack of enforcement of these regulations and acceptable standards.

Our Association has repeatedly advised the Department of Transport of incidents and standard operating practices that we consider unacceptable. Transport Canada has admitted that not only were they unable to enforce all air regulations due to lack of inspectors and, also, that they lacked inspectors with any practical experience and working knowledge of the flight operations officer. On June 23, 1971 the Department of Transport filed a letter . . . which stated that it was the intention of this Ministry to establish licensing requirements for a flight operations officer. A copy of the recommendations of the I.C.A.O. divisional meeting were attached.

The Air Transport Association position stated 'there is no evidence that the standard of flight dispatch has ever had an adverse effect on safety, therefore, there is no reason to believe that licensing dispatchers will in any way contribute to a higher degree of safety' and, therefore, strongly opposed any requirement to license flight operations officers (dispatchers). . . . The Transport Workers Union Analysis and Report 'Air Safety and the Aircraft Dispatcher' provides conclusive and statistical evidence to the contrary.

Mr. W. M. McLeish, Director General, Civil Aeronautics, issued a letter dated May 17, 1972, advising that the subject of flight dispatch licenses was now in question pending a further meeting with the parties concerned. . . .

A letter dated January 23, 1973, apologized for 'not finalizing the matter at an earlier date. As soon as matters of higher priority permit, a determination will be made on this subject.' . . .

April 16, 1974 a letter from W. M. McLeish advised a study was in progress and further information would be available in the very near future. . . .

Mr. McLeish, in a letter dated July 2, 1975, referred to a meeting in Ottawa June 12, 1975 on the subject of dispatch standards and advised 'that rather than consider the licensing of dispatchers at this time, that an alternate means of accreditation might be explored.' A copy of a report dealing with the investigation of the dispatch organizations and facilities of the trunk and regional carriers in Canada was enclosed. . . .

In summary, this report regarding dispatch organization in Canadian air carriers states the concept of the System Operations Control Centers (SOC) as 'a sort of war room with representatives and computerized information from departments concerned with the economical utilization of aircraft. During irregular operations they should arrive at a consensus and recommend courses of action to Dispatch'. It further stated 'as long as their activities are confined to planning and recommendation to Dispatch, there is no operational conflict or safety problem'. It further indicated 'there has been some intimation, however, from pilots and Dispatchers that SOC Centers could exert an undue influence on operations'.

The report included the information 'In most air carriers, Flight Operations are responsible for and have full authority for all aspects of Operational Control. In at least two of our major air carriers there have been attempts to diminish the role of Flight Operations in Operational Control and as a voice in company affairs. In one case, Dispatch and the SOC Center are responsible to corporate areas in the company whose prime interest is that of economics. There could be implications for flight safety in such organizational arrangements and the apparent trend must be reversed'. This trend has not been reversed and, in fact, operational control erosion continues at an alarming pace.

On the subject of the licensing of dispatchers the report found that the licensing of dispatchers appeared to be unnecessary, however, the Department of Transport should provide for alternate means of improving operational control, training and the recognition of dispatchers. To this end, the Department of Transport should establish a specialist position to study air carrier operational control, in greater depth, to review Air Navigation Order, Series VII, Nos. 2 and 3 requirements, and to inspect and monitor air carrier operations in this area on a continuous basis. The report suggested it would be useful to get the assistance of the Canadian Air Line Dispatchers Association in these areas. The report closed by reiterating that flight operations must be responsible for, and have authority in, the operational and safety aspects of operational control."
(Emphasis added.)

Although ICAO recommended the licensing of dispatchers in 1971, the new ICAO licensing proposal, to which I have previously referred, would limit personnel licensing to flight crew members (pilots, flight engineers and flight navigators) to air traffic services personnel and to aircraft maintenance and overhaul technicians. The ICAO proposal did not provide for the licensing of flight radio operators, flight operations officers (dispatchers) and aeronautical station operators.

Air Navigation Order, Series VII, No. 2, part 3 is entitled "Flight Operations" and section 15 states:

> "(1) No person shall commence a flight unless the pilot-in-command and, where applicable, the flight operations officer authorized by the air carrier to exercise operational control over the flight, has approved and signed an operational flight plan setting forth the conditions under which the flight is to be conducted.
>
> (2) No person shall commence a flight under a flight watch system without specific authorization from the person authorized by the air carrier to exercise operational control over the flight.
>
> . . .
>
> (6) Where, under an approved flight watch system, operational control over a flight is to be exercised by a flight operations officer and not the Director of Flight Operations, that officer shall not be assigned to duty as a flight operations officer unless
>
> (a) he has satisfactorily demonstrated to the air carrier his knowledge of
>
> (i) the provisions of the Air Regulations necessary for the proper performance of his duties,
>
> (ii) the contents of the air carrier's Operations Manual and the operations specifications necessary for the proper performance of his duties, and
>
> (iii) the radio facilities in the aeroplane used;
>
> (b) he has satisfied the air carrier as to his knowledge of the following details concerning the operations for which he will be responsible:
>
> (i) the seasonal meteorological conditions and sources of meteorological information,
>
> (ii) the effects of meteorological conditions on radio reception in the aeroplane used,

(iii) the peculiarities and limitations of each radio navigation facility that is used by the air carrier,

(iv) the aeroplane loading instructions including preparation of aeroplane weight and balance forms, and

(v) the aeroplane performance operating limitations; and

(c) he has satisfactorily demonstrated to the air carrier his ability to

(i) assist the pilot-in-command in preparing the operational flight plan and flight plan,

(ii) provide the pilot-in-command with all information required both before and during flight that is relevant to the flight,

(iii) initiate such emergency procedures as are outlined in the air carrier's Operations Manual, and

(iv) co-ordinate operational control so as not to conflict with established Air Traffic Control, Meteorological or Communication Services procedures."

It is to be noted that the Air Navigation Order does confer a type of accreditation to the flight operations officer. That accreditation, if it may be called such, is in fact conferred by the air carrier. The flight operations officer must satisfactorily demonstrate to the air carrier his knowledge of the rules and regulations pertaining to the operations. In other words, the flight dispatcher's training and performance are determined by the air carrier alone. However, the carrier does report to the Department on how it exercises this responsibility. In Mr. Lamont's words:

> ". . . The way we understand it, as I interpreted it, is that we ensure that a carrier does do this and when we go in as an inspector we have the air carrier prove to us that this individual has demonstrated to the air carrier via an examiner whatever method that he has this knowledge."

Mr. M. Verrecchia, on behalf of the Canadian Air Line Dispatcher's Association, in reply to Mr. Lamont, stated:

> ". . . I have been involved in flight dispatch for almost 25 years now and I have seen two inspectors in my entire life in the flight dispatch office. . . ."

In Canada, large air carriers operate under either a flight dispatcher system or a pilot self-dispatch system. Under both systems, the flight dispatcher performs the following basic functions, namely, flight planning, flight crew briefing, and flight watch. The brief filed on behalf of the Air Transport Association of Canada, as regards proposed training standards, stated the following:

> "At the present time there are no prescribed training standards in the industry for flight dispatchers. As stated in the opening Section of this Brief, ATAC has recognized this problem for some time and has planned to develop a flight dispatchers training program manual along with a pilots manual and maintenance personnel manual, using the same concept as the Restricted Articles Training Program manual and the Cabin Attendant Training Programs manual.
>
> ATAC welcomes the statement of Mr. W. M. McLeish, Administrator, CATA, to the effect that the D.O.T. proposes to enter into discussions with ATAC relating to the development of 'an acceptable means of compliance'."
> (Emphasis added.)

As regards the licensing of flight dispatchers, ATAC stated:

> "ATAC concurs with the position of D.O.T. with respect to the issue of licencing flight dispatchers. Particular reference is made to the evidence of Mr. D. E. Lamont, Director, Aeronautical Licencing and Inspection Branch in Volume 104, pages 21,627 - 21,640 and pages 21,651 - 21, 657.
>
> It is the position of ATAC that licencing of flight dispatchers will not achieve the goals sought by either the flight dispatchers or ATAC, namely the establishment of an acceptable means of complying with the required knowledge and experience of flight dispatchers. In effect, as verified by the evidence of CALDA, it is not licencing which is the objective, it is the establishment of training standards to ensure competence.
>
> It has been argued that a licence would in some way prevent the exertion of improper pressure by an air carrier on its employees. Evidence adduced during the Enforcement phase of this Inquiry clearly indicated that licencing was irrelevant with respect to this particular problem.
>
> While it is true that Annex 1 of Personnel Licencing of the Chicago Convention provides for licencing of flight operations officers, many countries have filed with ICAO notices that their regulations do not provide for such licencing. Indeed in recent conversations between ATAC and ICAO it was confirmed that the licencing of flight operations officers is not a common practice."
> (Emphasis added.)

FLIGHT ATTENDANTS

The Canadian Air Line Flight Attendants' Association (CALFAA) represents flight attendants who are employed by major air carriers. In its brief, CALFAA submitted that the licensing of flight attendants by the Ministry of Transport would cause the public to become more aware of the safety role of flight attendants, and that if licensed pursuant to a safety training and licensing program administered by Transport Canada, safety training would be removed from the profit area of the carrier's operation. They submitted that Transport Canada should institute and operate a safety training and licensing program for flight attendants and expressed their concern that many flight attendants receive no first-aid training during their yearly recurrent training program. They concluded:

> "We believe that a Federal training and licencing program will not only improve the competence of Flight Attendants, but will also reduce the conflict between a Flight Attendant's duty to enforce safety regulations and the duty to maintain high standards of service for the employer."
> (Emphasis added.)

In response, Mr. Lamont (DLI) stated:

> "Yes, I think from the Departmental point of view that the ANO requires a specified training program that must be approved by the Department and it specifies the type of training, the recurrent training, emergency procedures training that flight attendants must undergo. I think the system works well and we've had very few problems with the program as established within the ANO and established with the air carriers.
>
> Again, it's my personal opinion that a piece of paper really doesn't prove anything because again it's a snapshot in time. And, as you're issued a licence today, the change of equipment would not be depicted on that licence so you have to have an endorsement type of certificate endorsing the qualifications for that attendant to operate on different types of aircraft. So there are 5,500 flight attendants in Canada and they are changing, from equipment, quite frequently. You have again a massive organization within Transport to try and keep up with the licensing process."
> (Emphasis added.)

As I have pointed out above, the new ICAO proposal did not provide for the licensing of flight attendants.

The Air Transport Association of Canada took the following position on the licensing of flight attendants:

> "The evidence that has so far been submitted in favour of flight attendant licencing centers around training and qualification standards. It has been suggested that D.O.T. should assume total responsibility for these activities. There are also assumptions that licenced flight attendants would provide the travelling public with a higher level of safety.
>
> <u>ATAC cannot support the licencing of flight attendants. It is difficult to see how a licence will improve safety. Flight attendant training requirements are currently of a high standard</u>.
>
> Training requirements are subject to ANO requirements and they are approved and monitored by the Government regulatory body. A licence will have no bearing on this.
>
> Cabin safety procedures are also subject to ANO and D.O.T. controls. ATAC fails to see how the licencing of flight attendants would have any impact on further improving safety in these areas.
>
> CALFAA has also stated that a licence would give flight attendants more pride, 'clout' and respect from the travelling public when enforcing safety regulations. ATAC does not understand how this would be so and what role a licence would play in interactions between passengers and the cabin crew. It is very difficult to establish the direct relationship of improved safety for the travelling public and a flight attendant's licence. <u>It is felt that high standards of safety training now exist and that the introduction of licencing will do nothing to improve flight attendant competence or passenger safety</u>."
> (Emphasis added.)

<u>COMMENT</u>

I am not satisfied that the licensing of the various groups of unlicensed personnel would materially improve the role that they play and can play in the aviation safety system, nor would warrant the great expenditure that would be necessary to undertake such a program.

Mr. Lamont gave the following evidence as to the impact that such requirement would have as follows:

> ". . . If it was handled the way we handle a pilot's licence, of course, we would have to get into the basic training of all of these people, leading up to the

examination, certification, medical, whatever standards they must meet and then the other side of it would be the endorsement and recurrency, training et cetera. And that is covered under the existing air navigation orders for some of these people employed by the carrier.

We would have to hire a large staff within the Department to follow through on this sort of process for the initial licencing and then for the recurring licencing and for any additional training that these people got over and above what they had for the initial issue because the licence is just a snapshot in time of what a person's qualifications are. There are additions to that, deletions to it. It would be a very, very difficult process to institute within the Department of Transport."
(Emphasis added.)

I do not minimize the important role of and the contribution made to safety by flight dispatchers, flight attendants, flight service specialists and other unlicensed personnel. However, many of their complaints could be remedied if Transport Canada would monitor the manner in which the activities of these personnel are being directed.

In my opinion there should be a Flight Dispatchers Training Manual prepared by the airline carriers and approved by Transport Canada. Inspectors should inquire into whether the carriers are complying with the Cabin Attendants Training Manual. I have already indicated that I think avionics maintenance engineers should be licensed, and a form of licensing or accreditation be attached to the functions of a Design Approval Representative and an Airworthiness Inspection Representative but, with these few exceptions, I am not satisfied that there is any need at the present time for a more extensive licensing program than is presently in effect.

PART XII

WEATHER FORECASTING

As I noted in Volume 1 of this Report, the environment was a contributing factor in 59% of the fatal accidents between the years 1976 and 1978, and in 53% of the non-fatal accidents over the same period. The Public Service Alliance of Canada in its brief submitted the following schedule which listed 493 accidents between January 1976 and December 1979 in which the weather was a contributing factor:

"Aircraft Accidents
January 1976 - December 1979

Assigned Factors		No. of Cases
Weather:	Low Ceiling	100
	Whiteout	70
	Fog	67
	Snow	62
	Rain	44
	Mountain waver, downdrafts, updrafts	40
	Smoke, haze, dust, sand	22
	High density altitude	20
	Carburetor icing conditions	18
	Airframe	14
	Turbulence, thunderstorms	13
	Wind shear	11
	High Temperature	5
	Line Squall	3
	Clear air turbulence	2
	Local whirlwind	1
	Adverse winds aloft	1
	TOTAL	493
PILOT CONTINUED VFR FLIGHT INTO ADVERSE WEATHER		157
INADEQUATE PRE-FLIGHT PREPARATION OR PLANNING		305

(Source: DOT Aircraft Investigations Branch)"

The above table illustrates the close relationship between the human factor and the environmental factor. It is to be noted that in 157 accidents the pilot continued a VFR flight into adverse weather and in 305 accidents there was inadequate pre-flight preparation or planning. One of the principal reasons for planning a flight is to avoid adverse weather.

A very detailed brief on weather services was submitted by Mr. James A. W. McCulloch, the Director General of Field Services with the Atmospheric Environment Service of Environment Canada. Prior to 1970, weather services in Canada were provided by the Department of Transport. In 1970, as a result of a recommendation of a Royal Commission, the Department of the Environment was created which included the Atmospheric Environment Service (AES), now Canada's national weather service. AES is concerned with meteorology, that branch of science which deals with atmospheric phenomena, including physics, chemistry and atmospheric dynamics. One component of weather services is the Aviation Weather Services Program conducted jointly with CATA.

AES provides services not only to the aviation community but also to the general public, agriculture, forestry, resource development, recreation, military operations, marine, trade and commerce, construction and surface transportation. To carry out these services, AES involves itself in data acquisition, the dissemination of data to various users through a communications system, an analysis and forecast program for the provision of weather forecasts, weather warnings and advisories, as well as the establishment of weather offices and regional weather centres.

With the change made in the early '70s, an agreement or memorandum of understanding was negotiated between the Department of Transport and the Department of the Environment to ensure the continuity of meteorological support to CATA programs. The following is a summary of the main points of the agreement:

> "- the Air Administration of DOT (CATA) is the authority responsible for stating the meteorological requirements, identified with national aeronautics policy, for meteorological services;
>
> - the AES provides services on a priority basis in response to these stated requirements;
>
> - the AES prescribes the standards and practices for meteorological observations and services, instrumentation and training;
>
> - the AES is designated to the International Civil Aviation Organization (ICAO) as the meteorological authority responsible for providing or arranging for the provision of meteorological services for international air navigation on behalf of Canada."

Mr. McCulloch gave the following explanation of the memorandum:

> "Our relationships with Transport are based on a memorandum of understanding which was developed at the time the Atmospheric Environment Service was transferred to the Department of the Environment.
>
> . . .
>
> I think that the two points of that interface, at least in the memorandum of understanding that are fundamental to everything that follows is that Transport states the requirements of aviation, even the meteorological requirements. And the weather service then identifies the standards for meeting those requirements and in consultation with Transport identifies the mechanism by which the requirements can be met. But the meteorological standards are our responsibility, and the responsibility for them implementing is a shared responsibility.
>
> An example of something which grew after the split was this aviation weather information service that has been referred to, the flight service stations. Transport identified that there was a need for a lower level of weather service than the interpretation and consultation that could be provided by the meteorological technicians performing the presentation function. And so they found that they could introduce this as an additional duty at flight service stations. And they come to us, we helped them identify what sort of training might be required to undertake the tests as they outline them. . . ."
> (Emphasis added.)

The determination of meteorological services requirements by CATA is based upon a Meteorological Requirement Index (MRI) which weighs key factors involved in commercial air operations. The MRI is a sum of weights determined by variables, such as the weight, class of largest aircraft using the airport with a movement frequency of 500 or more per annum, flight rules certification, airport classification, etc. The following statement sets forth the former CATA policy:

> "3. (i) as an example, Castelgar, British Columbia, has a weight class of '2' (largest aircraft operating are 7,000 to 75,000 lbs. weight). A Class I (scheduled) commercial air service presently serves this airport. The significant number of the aircraft are propeller driven and the airport is certified for IFR operations. The score from Table 3, is 1.5 + 1.0 (the circled values on the table), or 2.5. Castlegar is classified as a 'secondary' airport and in 1973 had 1,654 scheduled and 4,137 non-scheduled itinerant movements. The score from Table 4, is 1.0 + 0.5 (the circled values) or 1.5. The MRI for Castlegar is 2.5 (Table 3) + 1.5 (Table 4) or 4.0.

(ii) from Table 5, the level of meteorological information service for Castlegar, therefore, should be:

(a) aviation weather observations 24 hours per day, and;

(b) full meteorological information services (part or full time)."

This policy provided a level of aviation weather service at the largest airports for the operators serving the majority of the travelling public, but contributed little to the requirements of general aviation. The new policy allows for the provision of weather services at all Arctic B and C airports.

A brief prepared by Mr. William Bain, a CATA employee with the Aeronautical Licensing and Inspection Branch of Transport Canada, in charge of airport control and flight information services, outlines the present weather facilities:

> "The existing weather network involves the collection of hourly weather observations at over 300 aerodromes and other locations. These observations are used to determine present weather conditions and to prepare forecasts for the public as well as many other users including aviation.
>
> It should be noted that the approximately 300 observations are not taken on a continuous, 24 hour basis and can vary upward from as low as three observations per day, depending upon season of the year and day of the week.
>
> The collection of weather information is only the first phase in presenting the necessary information to the pilot/dispatcher for the safe conduct of operations.
>
> Dissemination of timely, meaningful weather information to the user is carried out through a lesser number of facilities than that involved in the observation program. Any pilot with access to a public telephone has access to an aviation weather briefing, either through a local or long distance call to an AES facility or through a toll-free call to a FSS.
>
> These facilities, scattered across the country, provide weather information in varying degrees of detail to the aviation community via Area and Terminal forecasts, hourly and special observations. These same facilities are also shared by the general public and other government agencies, thus their efficiency toward aviation is reduced depending upon the demands placed upon the system by the other users.
>
> Area forecasts (FA) for the approximately 114 forecast regions are prepared four times daily and are valid for 12 hours. Terminal forecasts (FT) for the approximately 190 aerodromes are normally prepared four times daily and are

valid for 12 hours. Upper level wind and temperature forecasts are prepared twice daily.

All of the above weather information is disseminated via the AES teletype circuits on a requirement/demand/availability basis. Further distribution to aviation is accomplished via the FSS AWIS, radio, T.V. and automatic broadcasts.

A typical weather reporting station, AES or FSS, providing hourly weather observations on a 12 to 16 hour basis, costs between 100K to 200K per year in addition to the initial capital cost of from 10K to 500K. Contract weather station costs are slightly lower in O & M and considerably lower in capital.

Automatic weather reporting stations exceed 100K in capital while their O & M is low. The main drawback to an automatic station for aviation is technical as the existing automatic stations cannot provide acceptable information in such areas as cloud cover, sky condition, type and amount of precipitation and visibility.

Automatic sensors capable of some of these functions are being developed and tested but all of the requirements of aviation will not be satisfied by automation in the foreseeable future. Automation will, however, perform an ever increasing role in the observing, relaying, compiling and dissemination of meteorological information for aviation as well as the Canadian public."

Mr. Bain explained that AES has weather observing facilities, known as CORE stations, which constitute a grid network across the continent where observation, collection, and dissemination of information used in the production of public and aviation weather forecasts take place. Other facilities performing tasks similar to CORE stations include AES weather offices, AES weather stations, stations under contract to AES, Arctic aviation weather reporting stations, Department of National Defence stations, flight service stations, DEWLINE stations, private aviation weather reporting stations, marine stations and automatic stations. Mr. Bain went on to explain:

"AES weather offices, approximately 60, provide the highest level of weather service to the public and aviation in the form of forecasts, consultations (weather analysis) and presentations (weather briefings). Pilots outside the military no longer have any personal contact with actual forecasters so pilot involvement is limited to self-briefings or briefings from AES technicians or FSS specialists.

AES stations, approximately 125, maintain full (H 24) or partial (less than H 24) surface and/or upper air weather observing programs.

DND weather stations, approximately 21, provide a variety of services from forecasting to observing, primarily for military aircrews.

FSS, approximately 116, provide a variety of services from presentation through full or partial surface weather observing programs.

DEWLINE stations, approximately 15, provide a partial observing program, mainly for re-supply aircraft.

Automatic stations, approximately 49, provide a continuous, limited observing program; limited in that aviation requirements for visibility, precipitation and sky conditions cannot be acceptably accomplished for technical reasons.

Marine stations, approximately 40, provide a continuous or partial surface observing program.

Private Aviation Weather Reporting Stations, approximately 14, usually funded and controlled by a single company or municipality, normally provide current weather information for their own use; however, some will pass current information to outside agencies in addition to providing AES with a monthly summary for historical purposes.

Arctic Aviation Weather Reporting Stations (AAWRS), approximately 16, located in the Yukon and Northwest Territories on Arctic B or C airports, provide partial surface weather observing programs. These stations are staffed by Territorial employees who are trained by AES. Funding is from TC.

Selectively located across Canada, contract weather stations provide a variety of surface and upper air weather observations on a partial or full-time basis. These stations complement the forecasting grid requirement or provide for additional aviation needs.

In addition to the above, pilots operating in close proximity to the U.S.A./ Canada border have access to the American FSS system and to the Enroute Flight Advisory Service called Flight Watch."
(Emphasis added.)

Many witnesses expressed concern over the level of weather training given to pilots. For instance, Mr. Joseph K. Pacholik, a Meteorological Specialist, and Mr. Gerald F. Flucke, the Supervisor of Technical Support Training, both from the Meteorological Training Centre, testifying on behalf of the Public Service Alliance, stated:

"With the exception of aircrew trained in the Canadian Armed Forces, pilots in the 'private' and 'commercial' licence categories, with and without 'Instrument' endorsements, have, in general, a totally inadequate knowledge of the meteorological conditions and processes affecting safe aircraft operations. Pilots in the Senior Commercial and Air Transport Rating categories have only a marginally sufficient level of knowledge in this area.

. . .

Most private pilots and many commercial pilots are unable to extract accurately even the most basic information from the simplest form of weather data - the hourly weather report (SA).

. . .

The main 'carrier' of forecast weather conditions, the Area Forecast (FA) remains unintelligible to all pilots except those who have received additional training in meteorology, this training is well above and beyond that which is normally required to pass the private and commercial licencing tests. . . .

We must not overlook the Senior Commercial and Air Transport Rating categories where there are also areas of inadequate knowledge. These pilots, who operate more sophisticated aircraft and at higher altitudes, have deficiencies such as

(a) an inability to make use of high level meteorological charts outlining jet streams, clear air turbulence, temperatures.

(b) an inability to uderstand the meteorological generated display on airborne radars for the purpose of avoiding unsafe areas of turbulence, hail and heavy rain."

(Emphasis added.)

Mr. John F. Mornan, the officer in charge of the weather office at Windsor and a teacher of meteorology at St. Clair College and the School of Continuing Education, testified in part as follows:

"Two or three months after groundschool graduation, few of the students/private pilots are able to effectively read such meteorological data. They often expect to be given refresher training by weather office personnel, even over the telephone. Weather office personnel tend to resent this, since it is very time consuming; yet the student/pilot, who paid the FBO for groundschool, seems to expect free training as a right when in contact with a weather office. The fact that the pilot is responsible for remaining current, is given short shrift when it comes to 'remembering all that Met stuff'."

(Emphasis added.)

There were some who felt that since the early 1970s, when AES took over the provision of weather services from the Department of Transport, too low a priority has been assigned to aviation weather. Mr. Mornan did not share this view when he stated:

"Many AES W1 level offices are still located at airports where FS Stations have been established, due to the historical development of Canadian weather

services. The demand for and use of weather services by other users in Canada has vastly expanded in the past 15 years or more. Over this period, the AES personnel handled all weather services, including aviation, with the exception of air-to-ground radio communication and at some locations where it was not considered cost-effective to place both weather and radio personnel. At co-locations, the aviation customers, usually not more than 15% except at major centres such as Toronto, were easily handled by AES staff. This remains unchanged. However, many pilots, long used to instant and preferential service, have been resentful at having to take their turn among the many other customers.

As a result, parallel services at co-locations have often developed, and are escalating sharply in the Ontario Region, even in spite of high level AES-CATA agreements to the contrary. The matter becomes expensive and ludicrous when the FS Station located a few steps from the W1 AES Weather Office, is provided with separate receive-only drops on one of, or even both, of the meteorological teletype circuits used in the Weather Office. Toll-free telephone service has been publicly promised, and partially set up, at FS Stations, even when co-located with AES W1 offices. A ring-through device to the Weather Office is said to be in the process of being installed at all co-locations, but the number of times calls will be referred is in doubt."

Mr. Mornan is opposed to any preferential weather services being assigned to general aviation:

"There is no need for FS personnel to provide weather services over the counter and by telephone, to aviation customers, where AES W1 offices and CATA FS Stations are co-located, except during periods when AES W1 service is withdrawn during silent hours for reasons of governmental economy. Parallel services at such locations provide a favoured status to aviation customers which is not shared by others. <u>If government resources are used to give such preferential treatment to one relatively small group which is mostly engaged in private recreational flying, then similar services could reasonably be demanded by the fishing and agriculture industries. These groups are far larger and of much greater economic importance to Canada, but do not even get toll-free telephone service</u>.

If expanded weather services to aviation is a vital and cost-effective requirement, then AES W1 services should be used wherever available, on air and ground communications media. This would avoid the split-weather services and their attendant difficulties, being experienced in the United States. Supervision, Standardization, and control would all be assured. Historically, even in wartime, split control of weather services has never been sanctioned in Canada. The best level of service on all communications media, for as long as economically suitable each day, would be accomplished via AES W1 service, to the betterment of aviation flight safety.

<u>In Canada, one person in about 400 is a qualified aircraft pilot, and over 75% of these fly less than 100 hours per year in private recreational flying. In this</u>

context, how cost-effective is the new FS Station concept? Obligatory, or nearly so, VFR flight plans, turned down in the U.S. because of cost, provide much of the workload. At FS Stations where an AES W1 office is co-located, there is no need for FS personnel to provide weather services except on air-to-ground radio and in any periods when the W1 is not operated. Major airlines, through their own dispatch organizations and contact with W1 offices at AES Regional Weather Centres, handle most of their own weather needs. Existing AES W1 level offices, during their hours of operation, could provide a greater assist to aviation safety, through development of 'Pilot to Weather Office' air-to-ground communication facility, such as the 'COMMET' trial which was proposed in Quebec last year, but somehow never proceeded."
(Emphasis added.)

Messrs. Pacholik and Flucke were of the opinion that there was room for improvement in the provision of weather services to aviation when they wrote:

"We feel that Meteorological Technicians could provide higher quality weather information if they had a better understanding of the requirement, use, and significance of weather data to the aircrew. It is worth noting that both the USA Flight Service Specialist and the USA Weather Briefer are required to take pilot familiarization training, usually in the form of the Private Pilot Ground School Course. Essentially, we feel that the briefer should have enough experience in aviation to allow him to see weather as pilot sees it. The information provided would be more relevant to the needs of the aviator."
(Emphasis added.)

Mr. Charles F. Burbank, an Air Canada pilot and President of the International Flying Farmers, to whom I have previously referred, testified as follows:

"Q ... Do you have any comment as to how accurate our weather reports are in this country?

A I think the reporting as such is probably accurate enough. It's the forecasting which leaves a lot to be desired.

Q What do you say about that?

A Well, I just heard at the Convention of the Saskatchewan Flying Farmers this past weekend, and we were fortunate to have Mr. Ross Elliott who is head of the Weather-Related Accident Co-ordination Progam in Ottawa and they showed a very interesting film.

Now this subject was discussed about weather forecasting in Canada. And it was the general view of the flying farmers out there, the long time flying farmers, those who have been flying for 20 or 25 years, that the quality of weather forecasting in Canada has not improved, it has gone

downhill in the last 20 years. And the general feeling also was that in the same period of time the quality of weather forecasting has improved in the United States.

Now I realize that, you know they do have more resources in the United States. I am not familiar with their training program for forecasters, I am not familiar with the nuts and bolts of either system, but I do pass this comment along to you that the perception of the users in Canada is that our system has gone downhill.

Q Have you had any experience that would confirm this impression?

A Well, I have both in my private flying and in my airline flying that we don't produce terribly accurate forecasts a great deal of the time. Again I can't give you percentages of being correct or incorrect. But certainly I have seen weather destination VFR and IFR that didn't even approximate what the forecast said it was going to be."
(Emphasis added.)

Mr. William Bain, to whom I have previously referred, gave his personal opinion as to the quality of the present weather services in Canada in the field of aviation:

"Q If I may leave the brief for a moment, which I understand is the official position and explains the present situation, and move into the realm of your personal opinion, do you think that the present weather information service for aviation is adequate in Canada?

A No, sir.

Q What do you think is required?

A We need more dependable -- more and more dependable aviation forecasts. In my travels around the countryside, almost every time, without fail, when I talked to a pilot - and he's not flying between Toronto and Ottawa necessarily but he's up in the booneys and he depends on his forecasts. They're very disappointed with the quality of forecasts they are receiving.

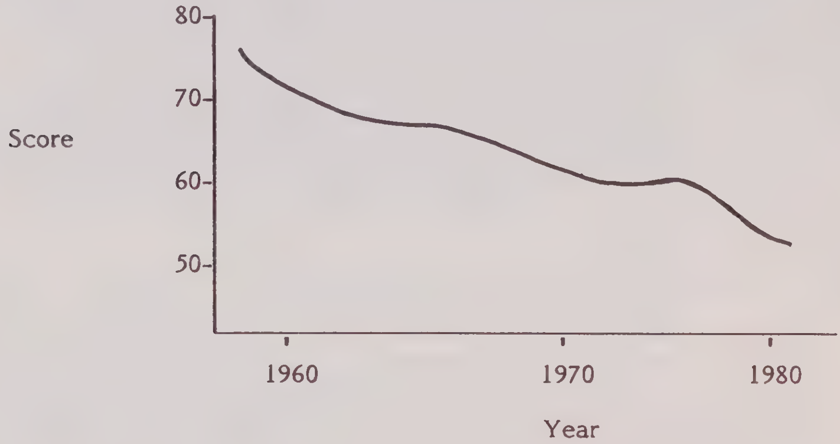
Moreover, the fact that that forecast stays in vogue for such a long period of time, even after the official observations have shown that the forecast is very incorrect. It's a matter of the time of updating, and I think, from Mr. McCulloch's brief on Friday, to me, it became quite clear that aviation weather is last of AES's priorities. They've got all sorts of other nice glowing phrases that go along with what Atmospheric Environment is going to do. When it comes down to civil aviation weather, I'm not even too sure if he mentioned it. It's at the bottom of the totem pole."
(Emphasis added.)

Mr. McCulloch replied to the above testimony:

"Mr. Bain remarks that, to him, it was quite clear that aviation weather is the last of AES's priorities. During my testimony, page 18,053, I outlined AES's priorities as first of all the safety and security of the general public, of aviation and marine interests. I also refer the Commission to the material accompanying the AES brief, in particular, Annex B Policy on the Provision of Meteorological Services, Page 10, Priority A Services, which clearly places aviation in the top of AES service priorities."

In an attempt to determine whether or not forecast accuracy was improving or declining in Canada, the Commission requested Environment Canada to verify the accuracy of forecasting over the last several years. Environment Canada accepted this mandate and prepared the following summaries as to the accuracy of weather forecasting which are hereinafter set forth:

"A. 36-Hour PROGNOSTIC CHART - VERIFICATION 1957-1980



Background

The 36-hour prognostic chart issued by the Canadian Meteorological Centre (CMC) Montreal is received routinely in all forecast offices in Canada. This chart depicts the pressure patterns expected to appear on 'tomorrow's weather map'. Historically, it established the framework within which the forecaster developed a specific forecast of various weather elements.

Verification

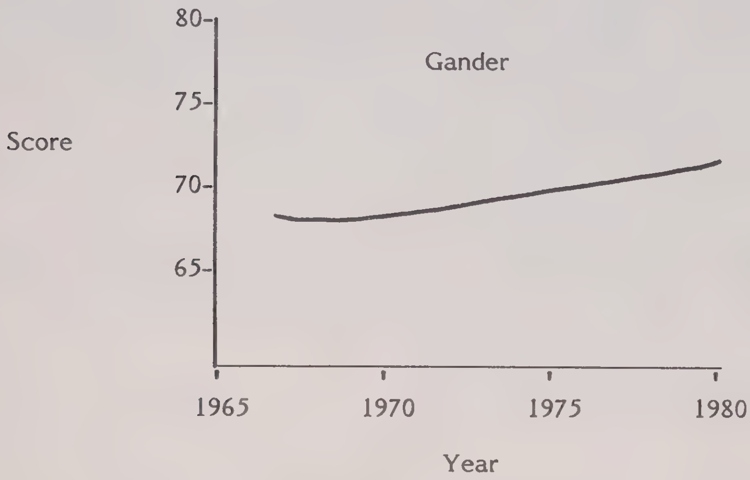
The above graph, is a verification depicting the score (measure of accuracy) to this chart. The meteorological jargon for this score is S1. Technically it

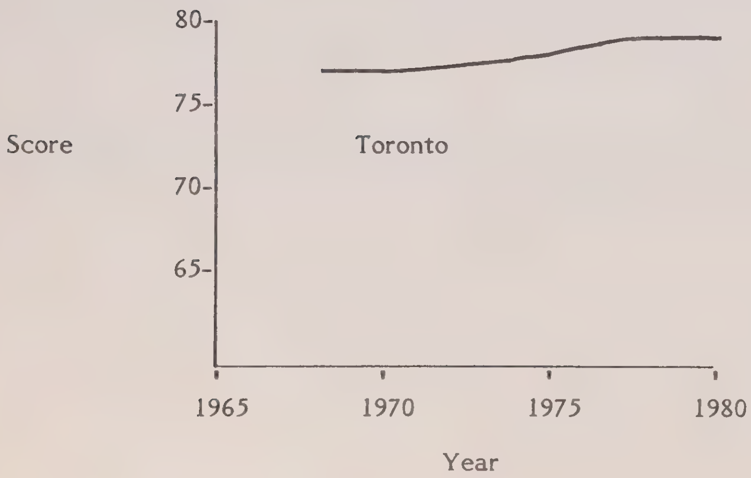
is a measure of the error in the pressure pattern depicted on the chart. (Note: pressure pattern is a direct measure of wind speed and direction, among other things).

Since the S1 score is a measure of error, the smaller the number, the better the prognosis. To be noted is the overall downward trend of the curve from 1957 (about the time computers were introduced at CMC).

Clearly, the long-term trend in ability to predict the state of the atmosphere 36 hours in advance is one of improvement.

B. AVIATION AERODROME FORECAST VERIFICATIONS





The above graphs depict the scores which focus on the combinations of cloud ceiling and surface visibility, observed v.s. forecast, at Gander, Newfoundland and Toronto International.

The score has a possible range from zero - a very bad forecast - to 100 - a perfect forecast.

The score, considered as a measure of skill, does have certain limitations: first, it does not recognize a forecast of variable conditions - that is, even if a forecaster had correctly predicted fluctuating visibilities in snowflurries, the score would assume a constant visibility; secondly, the score does not account for amendments issued by the forecaster.

Despite its limitations, the record can still provide useful information with respect to trends. The aviation forecasts show a slight but gradual improvement over the past 10 to 15 years. There is no reason to believe that other aviation aerodrome forecasts would not display similar characteristics.

Note the differences in the scores for Gander and Toronto. These differences can be accounted for by:

i) actual climatic differences - that is, poorer weather on the average at Gander

ii) differences in the density of the observational database surrounding the station - that is, a much higher density of stations surrounding Toronto. This latter point clearly indicates the importance of a strong database.

C. UPPER LEVEL WIND FORECAST VERIFICATIONS 1975-1980

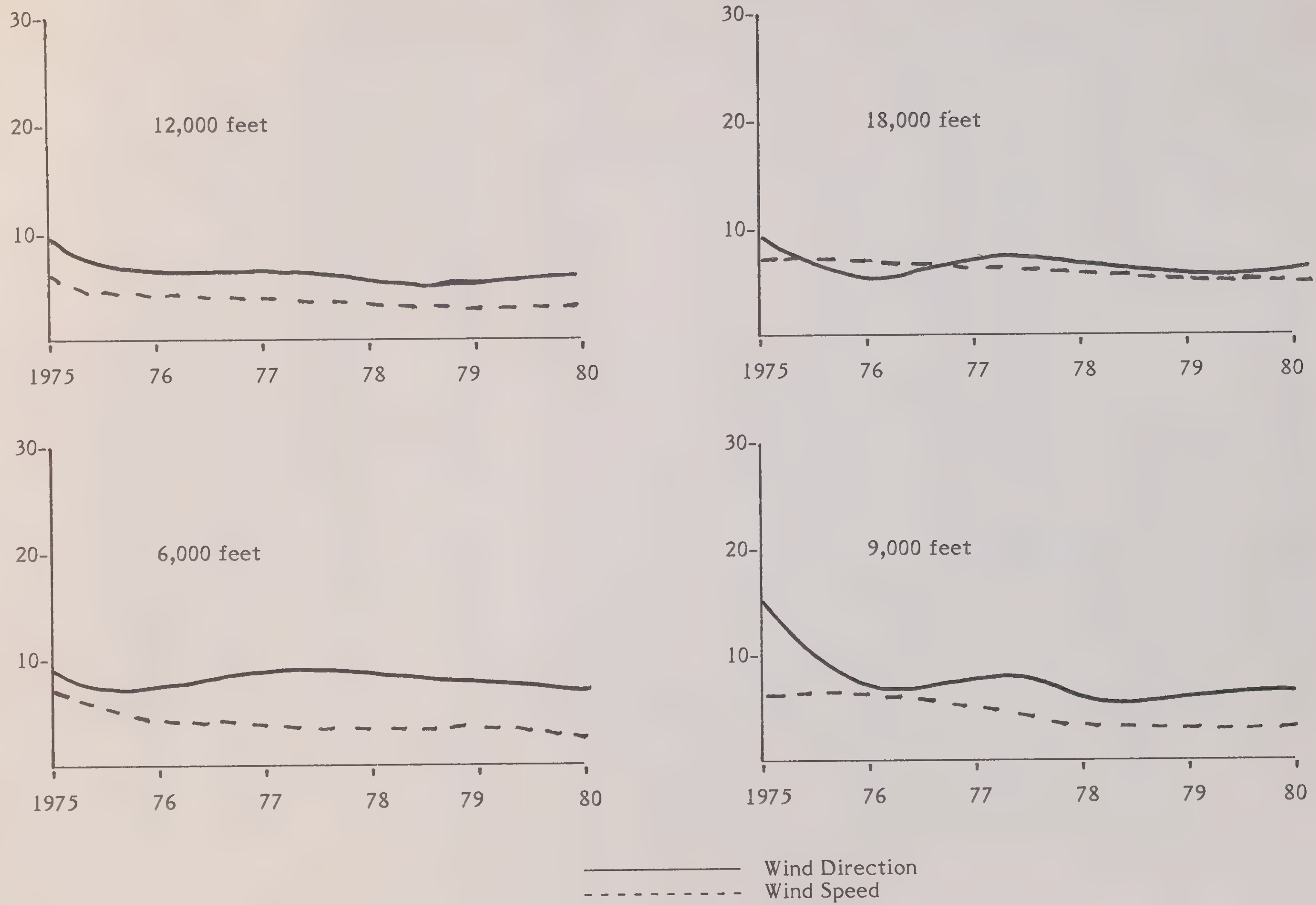
The attached graphs depict verifications of upper level wind speed/direction over a 6-year period for 35 of the 115 forecast locations in Canada.

The graphs depict percentage of the forecasts which had significant errors in wind speed or direction. The four levels examined are 6, 9, 12 and 18 thousand feet.

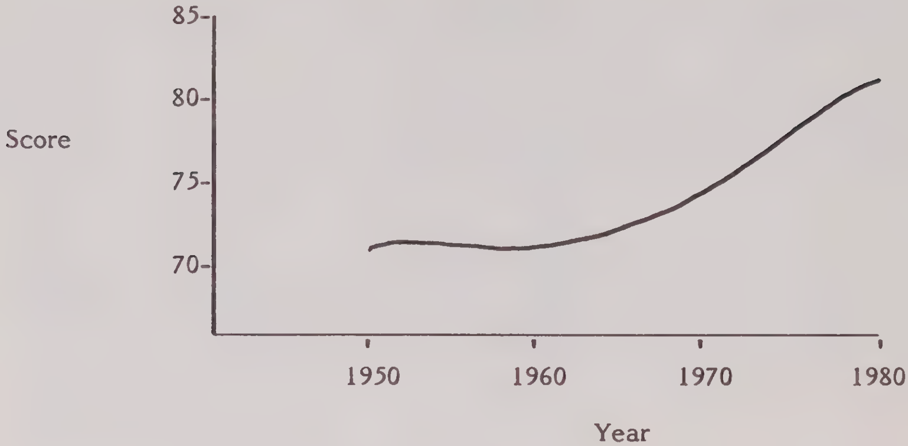
The graphs indicate that over the past 6 years, forecast accuracy has shown a slight improvement in wind speed and an approximate steady error rate in direction (i.e. just below 10%).

UPPER LEVEL WIND FORECAST VERIFICATIONS 1975-1980

Percent of Forecasts with Significant Error



D. PUBLIC FORECAST VERIFICATION - St. John's Newfoundland 1950-1980



The above graph depicts the record of forecast verification for the 36-hour public forecast for St. John's, Newfoundland. These forecasts were produced by the Newfoundland Forecast Office at Gander.

The score has a numerical range from zero, a very bad forecast, to 100, a perfect forecast.

It is evident to the eye that during the last 10 years or so, marked improvement has occurred. Much of this improvement can be credited to improvements in 'tomorrow's' forecast as a result of improved computerization and better numerical weather prediction techniques."
(Emphasis added.)

Commenting on those verifications, Mr. McCulloch stated:

"Generally speaking, the verifications indicate a gradual improvement, or at the least, no deterioration in forecast accuracy over the years. The loss of a portion of the database due to fiscal restraint in recent years has been offset by advances in technology such as automation and computerization, and improved prediction techniques.

Over the next few years it is perceived that continued advances in technology and its applications will contribute further to the forecast products and aviation as a whole. As an example, specifications are being developed for the production of automatic weather stations that will not only be suitable for aviation purposes, but that will enhance the database in remote regions and at manned stations which provide observations for only part of the day."
(Emphasis added.)

Mr. Bain favoured the creation of a separate aviation weather service:

> "Q How would that work? Would that be taken out of AES?
>
> A Partially. Well, at the present time there are 29 Arctic weather reporting stations in the Arctic and the USAF have 15 weather reporting sites. AES have only 10 and three automatic stations and we have three private aviation weather reporting stations in the Arctic.
>
> If you add all that up, 80% of the weather observations in the Arctic are taken by or for aviation. In the southern part of the country the percentage is smaller, but it is increasing. Every time AES automates or reduces their CORE requirement we have to pick up the slack. I don't think we can afford a completely duplicated system. However, from all these observations, maybe doing our own forecasting, that is, all the collection of the information which should possibly go into the AES data bank, but then that information should be fed out to aviation oriented forecasters, people whose aim in life is aviation, not public forecast, not snowfall, but people who are interested, devoted to and a part of the aviation world. That way I think we would get (a) a better forecast, a more detailed forecast."

The information gathered must still be readily available to users. Generally, weather information outlets are located at major airports or population centres in this country. Messrs. Pacholik and Flucke analyzed the relationship between weather related accidents and remote areas where weather services to aviation are extremely limited. They discovered that a majority of weather related accidents occurred in areas of limited weather services:

> ". . . Generally, we feel that there are an insufficient number of outlets to satisfy both the general public and aviation users; the existing outlets are too far removed from areas of flying operations and the outlets are not easily accessible by telephone.
>
> Presently, aviation weather is provided in a coded fashion. This practice which evolved during World War II no longer meets the needs of today's pilot. Weather information should be available in ordinary, every-day language.
>
> Generally, weather services from the Canadian/USA border to about fifty degrees latitude in Eastern Canada and fifty-five degrees latitude in Western Canada are adequate, but north of that line, weather services become remote and inadequate.
>
> We also suggest that weather information be made more accessible through such means as a Public Broadcast System (currently in use in USA), cable TV, weather radio and toll-free telephone systems.

For example, let us look at Northern Ontario. At North Bay, Sudbury, Sault Ste Marie and Thunder Bay, the Department of Environment provides weather presentation (briefing) services. During certain hours when AES personnel do not man these stations, (especially evening and night shifts), the Flight Services Specialists are on duty to provide limited aviation weather briefings. North of North Bay, there are virtually no briefing services for aviation. Timmins, Earlton and Kapuskasing have Flight Services Specialists; other areas such as Moosonee (James Bay), Trout Lake and Lansdowne House do not have any aviation weather services. Moosonee is used by some small airlines and private operators as the main stopping point for northern flights. Also, Austin Airlines located in Kapuskasing, uses Moosonee as its major supply point to launch passenger and supply trips to more northern points such as Poste-De-La-Baleine, Inoucdjouac, Povungnituk, Nothingham Island, Belcher Islands, etc. For all travel through the Hudson Bay area, the aircraft operator can receive only limited weather information with difficulty.

In analyzing the computer data as supplied by the Accident Investigation Branch, we found that 51% of all weather-related aircraft accidents occurred in northern areas where weather services to aviation are extremely limited.

The following is a breakdown of all weather-related accidents in the various regions and the percentage that occurred in northern or remote areas:

Atlantic Region: 57%, north of latitude 47 degrees (line north of New Brunswick)

Quebec Region: 60%, north of latitude 48 degrees (line north of Baie-Comeau)

Ontario Region: 35%, north of latitude 45 degrees (line north of Wiarton-Smith Falls)

Central (Man/Sask): 29%, north of latitude 55 degrees; 88%, north of latitude 50 degrees (north of Winnipeg)

Western: 65%, north of latitude 54 degrees (north of Edmonton)

Pacific: 60%, north of latitude 50 degrees (north of Kelowna)"
(Emphasis added.)

Messrs. Pacholik and Flucke were of the opinion that the provision of weather services could be improved without a major increase in expense. On the following pages, Chart A, issued by Transport Canada, indicates the flight services stations across Canada. Chart B, issued by the Atmospheric Environment Service, shows all the AES stations across Canada, namely, the weather offices and weather data collecting stations, and these offices and stations are all named, except for those shown as automatic stations. The suggestion of Messrs. Pacholik and Flucke would involve the training of personnel to

perform the dual function of weather data acquisition and the presentation of weather information to the aviation industry. Mr. Pacholik, in his testimony, explained the manner in which that could be brought about:

> "MR. PACHOLIK: Well, the duties of the FSS don't necessarily have them in for a complete 8 hours or 7½ hours span and they can perform the other duties such as they do in some of the southern locations already, and the northern locations and the same with our upper air technicians throughout the north, which collect a certain amount of data and they are going into a computerized system now which will result, to a point maybe, in some reduction of staff.
>
> Now, at these same locations where we have already accommodations there for people, and so on, you could possibly expand the number of people there, if necessary, but this may not even be necessary, depending on the amount of service that's required in those areas, but basically train those people to perform the dual function of data acquisition as well as presentation of weather information to the aviation industry.
>
> . . .
>
> MR. OUELLET: So what you are saying is if all those AES stations the black dots, and all the FSS, the little circles, if the people there were trained to do this dual function, pilots would be getting better service?
>
> MR. PACHOLIK: Oh, most definitely. The other costs that might be involved is an increase of the communications system as far as provision of weather information to the people that would have to provide this service. In other words, you would have to establish or increase the information that is sent out on teletypes and so on to these various locations.
>
> . . .
>
> MR. OUELLET: I was just trying to understand the suggestion. At the risk of being simplistic, what you are suggesting is if we took these two maps and held them up to the light, all those dots could become weather observing and weather reporting stations.
>
> MR. PACHOLIK: That's right and the aviation industry would have one hell of a good service.
>
> MR. COMMISSIONER: What is lacking now?
>
> MR. PACHOLIK: What is lacking now is the training and the facilities for them to provide this service. That would be the weather information that has to come from other locations so that they could - well, for instance, a forecast for a specific area would have to be transmitted to that location so that the information --

MR. COMMISSIONER: It is not being done now?

MR. PACHOLIK: No.

MR. OUELLET: On page 20, the last paragraph, you state:

> 'We feel that meteorological technicians could provide higher quality weather information if they had a better understanding of the requirement, use and significance of weather data to the air crew. It is worth noting that both the U.S.A. flight service specialist and the U.S.A. weather briefer are required to take pilot familiarization training.'

MR. COMMISSIONER: That's the point you made earlier. It is the mutual training, is that right?

MR. FLUCKE: Yes, sir, and in response to Mr. Ouellet's question, I think it goes a little further. We indicated earlier in the brief that the FSS people should get more meteorological training and the AES people should get more aviation training."
(Emphasis added.)

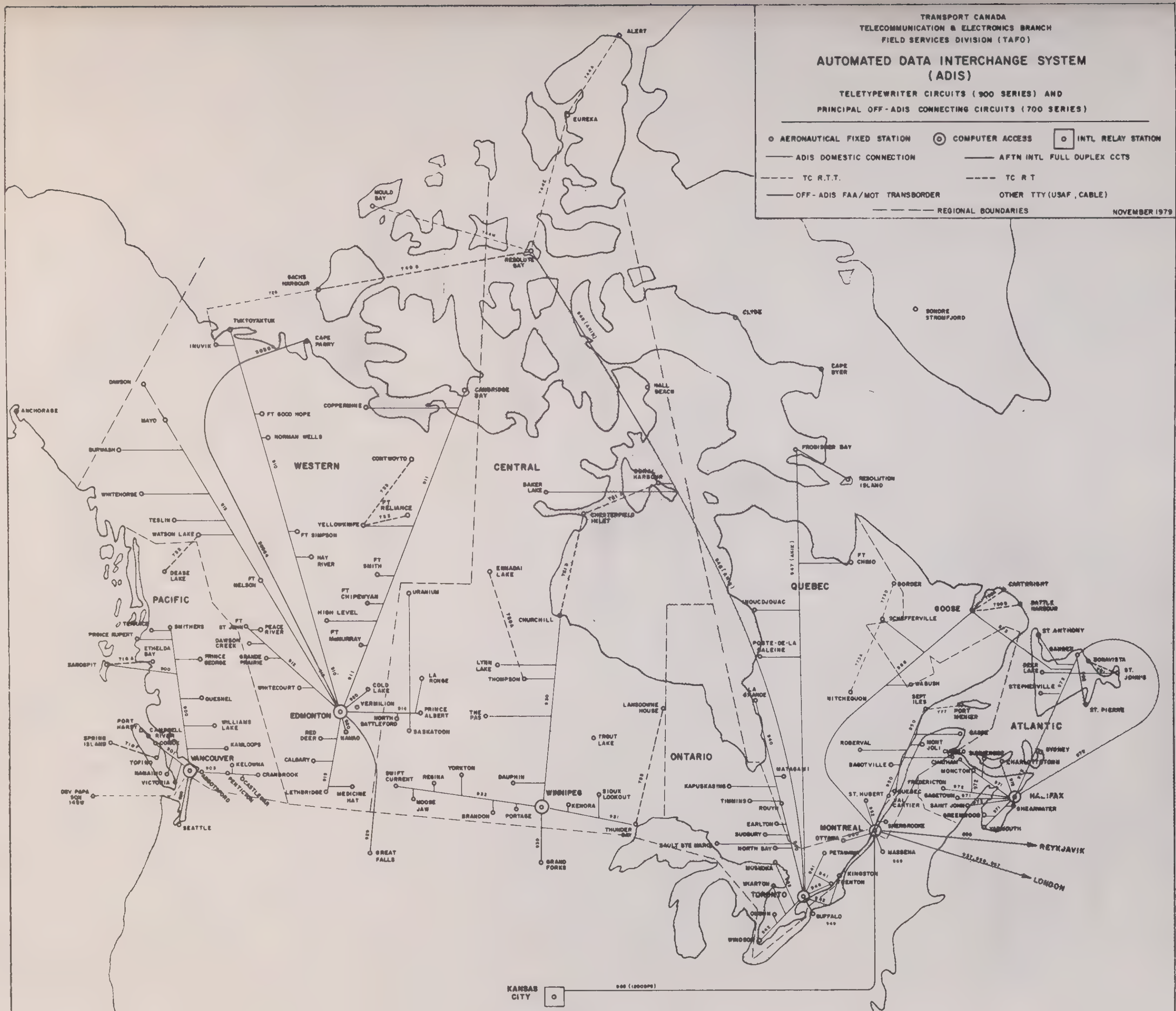
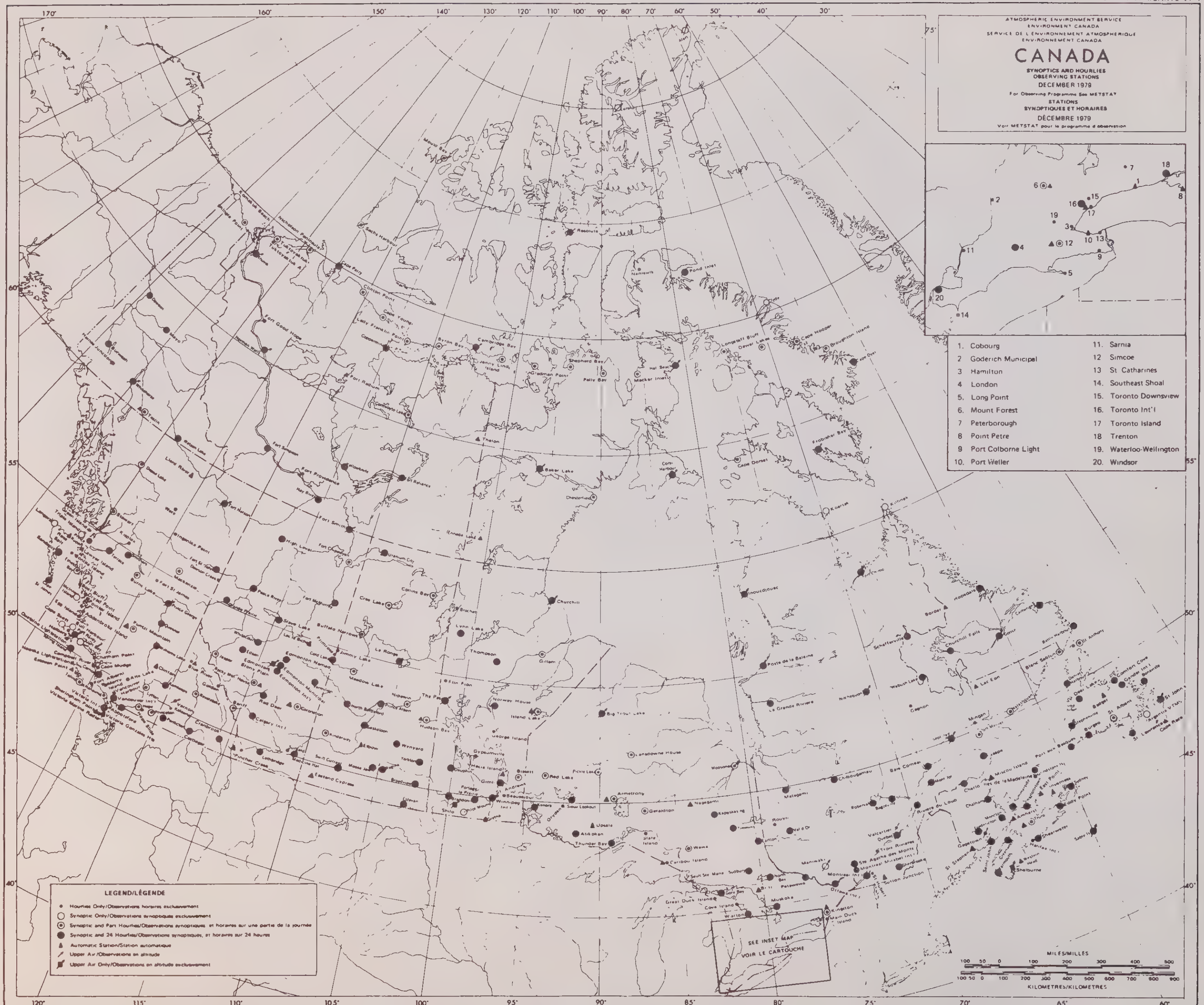

TRANSPORT CANADA
TELECOMMUNICATION & ELECTRONICS BRANCH
FIELD SERVICES DIVISION (TAFO)
AUTOMATED DATA INTERCHANGE SYSTEM
(ADIS)
TELETYPEWRITER CIRCUITS (900 SERIES) AND
PRINCIPAL OFF-ADIS CONNECTING CIRCUITS (700 SERIES)
AERONAUTICAL FIXED STATION
COMPUTER ACCESS
INTL RELAY STATION
ADIS DOMESTIC CONNECTION
AFTN INTL FULL DUPLEX CCTS
TC R.T.T.
TC R T
OFF-ADIS FAA/MOT TRANSBORDER
OTHER TTY (USAF, CABLE)
REGIONAL BOUNDARIES
NOVEMBER 1979
PACIFIC
WESTERN
CENTRAL
ONTARIO
QUEBEC
ATLANTIC
GOOSE
ALERT
EUREKA
RESOLUTE BAY
MOULD BAY
SACHS HARBOUR
TUKTOYAKTUK
INUVIK
CAPE PARRY
CAMBRIDGE BAY
COPPERMINE
CLYDE
CAPE DYER
HALL BEACH
FROBISHER BAY
RESOLUTION ISLAND
SONDRE STROMFJORD
ANCHORAGE
DAWSON
MAYO
WHITEHORSE
TESLIN
WATSON LAKE
DEASE LAKE
FT GOOD HOPE
NORMAN WELLS
FT SIMPSON
HAY RIVER
YELLOWKNIFE
FT RELIANCE
FT SMITH
FT NELSON
FT CHIPEWYAN
HIGH LEVEL
URANIUM
FT McMURRAY
PEACE RIVER
DAWSON CREEK
GRANDE PRAIRIE
WHITECOURT
PRINCE GEORGE
QUESNEL
WILLIAMS LAKE
KAMLOOPS
KELOWNA
CRANBROOK
SMITHERS
TERRACE
PRINCE RUPERT
SANDSPIT
PORT HARDY
TOFINO
NANAIMO
VICTORIA
VANCOUVER
ABBOTSFORD
PENTICTON
CASTLEGAR
SEATTLE
EDMONTON
COLD LAKE
VERMILION
NORTH BATTLEFORD
PRINCE ALBERT
LA RONGE
SASKATOON
RED DEER
CALGARY
LETHBRIDGE
MEDICINE HAT
GREAT FALLS
SWIFT CURRENT
REGINA
MOOSE JAW
YORKTON
BRANDON
PORTAGE
DAUPHIN
WINNIPEG
GRAND FORKS
KENORA
SIOUX LOOKOUT
TROUT LAKE
THE PAS
THOMPSON
LYNN LAKE
CHURCHILL
ENNADAI LAKE
BAKER LAKE
CHESTERFIELD INLET
CORAL HARBOUR
LANSDOWNE HOUSE
THUNDER BAY
SAULT STE MARIE
KAPUSKASING
TIMMINS
ROUYN
EARLTON
SUDBURY
NORTH BAY
MUSKOKA
WIARTON
TORONTO
WINDSOR
BUFFALO
KINGSTON
TRENTON
PETAWAWA
OTTAWA
MONTREAL
MASSENA
SHERBROOKE
ST. HUBERT
QUEBEC
VAL CARTIER
BAGOTVILLE
ROBERVAL
MATAGAMI
LA GRANDE
POINTE-DE-LA BALEINE
POVUNGNITUK
FT CHIMO
BORDER
SCHEFFERVILLE
WABUSH
NITCHEQUON
SEPT ILES
PORT MENIER
MONT JOLI
GASPE
CHATHAM
MONCTON
FREDERICTON
SAINT JOHN
GREENWOOD
YARMOUTH
HALIFAX
SHEARWATER
SYDNEY
CHARLOTTETOWN
SUMMERSIDE
STEPHENVILLE
DEER LAKE
ST ANTHONY
GANDER
BONAVISTA
ST. JOHN'S
ST. PIERRE
CARTWRIGHT
BATTLE HARBOUR
REYKJAVIK
LONDON
KANSAS CITY

CHART "B"


ATMOSPHERIC ENVIRONMENT SERVICE
ENVIRONMENT CANADA
SERVICE DE L'ENVIRONNEMENT ATMOSPHÉRIQUE
ENVIRONNEMENT CANADA
CANADA
SYNOPTICS AND HOURLIES
OBSERVING STATIONS
DECEMBER 1979
For Observing Programme See METSTAT
STATIONS
SYNOPTIQUES ET HORAIRES
DÉCEMBRE 1979
Voir METSTAT pour le programme d'observation
1. Cobourg
2 Goderich Municipal
3 Hamilton
4 London
5. Long Point
6. Mount Forest
7 Peterborough
8 Point Petre
9 Port Colborne Light
10. Port Weller
11. Sarnia
12 Simcoe
13 St Catharines
14. Southeast Shoal
15. Toronto Downsview
16. Toronto Int'l
17 Toronto Island
18 Trenton
19. Waterloo-Wellington
20. Windsor
LEGEND/LÉGENDE
Hourlies Only/Observations horaires exclusivement
Synoptic Only/Observations synoptiques exclusivement
Synoptic and Part Hourlies/Observations synoptiques et horaires sur une partie de la journée
Synoptic and 24 Hourlies/Observations synoptiques, et horaires sur 24 heures
Automatic Station/Station automatique
Upper Air/Observations en altitude
Upper Air Only/Observations en altitude exclusivement
SEE INSET MAP
VOIR LE CARTOUCHE
MILES/MILLES
KILOMETRES/KILOMETRES

An additional point that was made related to accidents at night involving night-endorsed pilots. At the present time, a private pilot can obtain a night endorsement with fifteen hours of flight time, of which five hours are devoted to instrument flight training. Night flying, however, is potentially very hazardous. While in the daytime a pilot can see cloud formations as he approaches them, at night the pilot may suddenly and without warning find himself in the midst of cloud and as a result lose visual contact with the ground. It is worth noting that no air carrier is permitted to assign a pilot-in-command to a commercial flight at night unless the pilot-in-command has an instrument rating.

This problem was dramatically illustrated in the following examples submitted by the Director of Aviation, Alberta Transportation Division, as follows:

> "Weather-related accidents at night continue to result in fatalities to night endorsed VFR pilots. The frequency that non-IFR trained pilots die attempting night cross-country flights suggests that the present night endorsement is a license to commit suicide. A pilot who cannot maintain or if necessary, regain control of an aircraft solely by reference to his flight instruments should not be permitted to attempt night cross-country flights. The suggestion that a night cross-country flight by a VFR pilot with a night endorsement is perfectly safe provided the pilot stays out of cloud or adverse weather conditions is ludicrous. How can he avoid something he cannot see?
>
> Six examples of this type of accident investigated by the undersigned in which 15 lives were lost, illustrate the need to change the qualifications for a night endorsement.
>
> (1) 5002-W60016 PA-28 CF-WKN 29 February 1976
>
> The pilot was attempting a solo night cross-country flight from Slave Lake to Peace River. Both departure and destination airfields were VFR although snow showers were forecast along the route. The pilot encountered a snow shower 15 miles after take off and attempted to reverse heading. Control was lost in the turn and the aircraft struck the ground with an angle of bank exceeding 90°. The pilot was killed on impact.
>
> Total time - 122 hours, night endorsed, 14 hours night, no other IF training.
>
> Safety Proposal - A requirement in the instrument training to meet specific levels of proficiency in basic manoeuvers.

(2) 5002-W90040 PA-28 C-GXNK 29 May 1979

During a night VFR cross-country flight the pilot encountered deteriorating weather. While attempting to descend below cloud the aircraft struck trees on a hillside and crashed. 4 dead.

Total time - 141 hours. Night endorsed, 31 hours night, no other IF training.

Safety Proposal - night endorsement instrument training should require specific levels of proficiency in basic manoeuvers, ie: recovery from unusual attitudes.

(3) 5002-W90099 Cessna 182 C-GWOV 12 October 1979

About 10 minutes after take off on a night cross-country VFR flight, the pilot reported he was encountering cloud and was attempting to climb on top. The aircraft was found the next day about 60 miles from the point of departure. It had struck the ground in a high speed, 40° nose down, 60° bank spiral dive. 5 dead.

Total Time - 1100 hours, 170 hours night but no night endorsement, no instrument training.

(4) 5002-W00096 Cessna 175 N8281T 26 September 1980

The pilot with one passenger, was flying at night from Whitehorse to Watson Lake. Deteriorating weather caused the pilot to reduce altitude in an attempt to remain clear of cloud. Eventually he ran into cloud and attempted to reverse heading. Control was lost in the turn. There were no survivors. 2 dead.

Total Time - 176 hours, American Licence, had 18 hours night, ½ Instrument training.

(5) 5002-W00114 A-Star C-GBEB 8 November 1980

The pilot was on a twenty minute night cross-country flight carrying two passengers when he encountered low cloud and reduced visibility in snow showers. The aircraft struck the ground with an angle of bank near 90° at a high rate of descent. There were no survivors. The investigation is continuing. 3 dead.

Total Time - 1740 hours, night endorsement, 200 hours night, no other Instrument training.

(6) 5002-W10015 Cessna 182 C-GWOH 24 February 1981

The pilot was on a 45 minute cross-country flight when he inadvertently ran into an area of heavy snow showers. The aircraft struck the ground

in a near vertical bank at a high rate of speed. The aircraft was demolished and the pilot was killed on impact.

Total Time - 1300 hours, night endorsement, 82 hours night and 5 hours instrument training.

It is recommended that a basic night endorsement permit the holder to fly solo at night within a limited distance from an airport in VFR conditions. An advanced night endorsement should be made available to pilots who have demonstrated their ability to control an aircraft solely by reference to their flight instruments. Such an endorsement would permit cross-country flight." (Emphasis added.)

COMMENT

The statistics demonstrate that weather is one of the most significant contributing factors in aviation accidents. To a pilot, particularly in general aviation, weather information is often the most important factor in flight planning and in the flight itself.

It cannot be overlooked that approximately one out of every seven aircraft accidents results in fatalities. Since the environment is a contributing factor in 59% of such accidents, it follows that aviation weather should be assigned the highest priority by those providing weather information. It is true that a farmer has an interest in the drying index, that a home heating company is anxious to know the correct heating data and that the general public has an interest in knowing the weather forecasts to plan leisure time. However, it is trite to observe that to a pilot and his passengers weather is often a matter of life or death.

It also appears that too many pilots, especially those engaged in general aviation, do not have sufficient knowledge to be able to understand and interpret meteorological data. I have already pointed out that at the present time a pilot may disclose that he has little, if any, knowledge with respect to weather, but still obtain his licence if he establishes sufficient grades in other subjects. For that reason, I am of the opinion that weather should be considered as a separate subject in every examination and that a candidate should have to obtain a passing grade in that subject before obtaining a pilot's licence.

What has also emerged is the desirability of those providing weather information to have a greater appreciation of the problems which pilots face, and thus there should be a pilot

awareness training program for those providing weather services. The corollary, of course, is that pilots should be required to demonstrate their competence in interpreting the weather information provided to them. If a biennial review were implemented, as I have earlier suggested, particular emphasis should be placed on the pilot's ability to interpret the weather information in every such review.

I have referred to some of the studies and some of the testimony with respect to the accuracy of weather forecasting. Although AES takes the position that weather forecasting is improving in Canada, the fact remains that many users do not share this opinion, and this is a matter of some concern on their part. The Canadian Air Line Pilots Association stated the concerns of most airline pilots in Canada as follows:

> "Unfortunately, weather forecasting remains an inexact science, despite satellites, computers and other tools of modern technology. <u>As a result, the Flight Forecasts issued by Environment Canada, while no less accurate than those issued by other countries, are frequently less accurate than required for aviation purposes and can mean considerable extra work, changes of plans and increased stress for the flight crew. This situation is most particularly reported by CALPA members flying in Eastern Canada, and many feel that the centralization of weather forecasting and the doing away with of local forecasters has aggravated matters.</u>"
> (Emphasis added.)

On February 9, 1981, Inspector R. E. T. Ritchie, ACAW, in an inter-departmental memorandum stated:

> "<u>It seems to me, and to many of my fellow drivers airframe, that the quality of forecasting has been badly eroded over the years. The advent of the computer and the centralization of forecasting appears to have caused a deterioration in weather forecasting that, in my humble opinion, could be a cause factor in some weather related accidents.</u>"
> (Emphasis added.)

For that reason particular attention should be paid to the suggestions of Messrs. Pacholik and Flucke, to whom I have referred. I agree with them that the number of outlets is not sufficient to satisfy those engaged in general aviation and that the existing outlets are too far removed from areas of flying operations. As was noted, 51% of all weather related aircraft accidents occurred in northern areas where weather services to aviation are extremely limited. I am of the opinion that through the training of personnel to

perform the dual function of weather data acquisition and the presentation of weather information to the aviation industry, and the resulting weather service that could be provided by existing AES stations and FSS stations, pilots would get better weather service without considerable additional government expense.

In an Aviation Safety Letter issued by CATA, June, 1980 reference is made to the current nationwide safety campaign:

> "A nationwide safety campaign is underway. The target: shrivel the number of weather-related accidents - the worst killer of all. During the past four years, 316 weather-related accidents caused 337 fatalities and 160 injuries.
>
> Pilots and operators are involved. We're calling for help from everyone, including the media, pilot associations, flying clubs, government departments, insurance companies, and others. Personal efforts by pilots, maintainers, managers, weather briefers - even passengers - are encouraged. The net effect will be a massive effort toward reducing this avoidable type of accident.
>
> Here's what we'd like to see: weather awareness campaigns by pilot associations and flying clubs; insurance premium incentives for accident prevention measures by operators, and so on. There's more: private pilots upgrading their weather knowledge; dispatchers taking more care with weather forecasts; passengers reporting close calls to our Bureau. We believe the readers of the Letter would find it interesting to read about each other's 'adverse weather' stories, particularly the incidents or near-misses. If you've got a worthwhile yarn to tell, please write it down and share it with others. Keep it anonymous if you prefer, but be sure to send it to us for publishing.
>
> Saying 'the weather will always be with us' is as empty and despairing as the parallel quip about the poor.
>
> Let's erase this blot . . ."
> (Emphasis added.)

The nationwide campaign, which is due to end December 31, 1981, is estimated to involve an expenditure of some $500,000.00.

I am of the opinion that the recommendations that I will be making as they relate to pilot training, weather technician training, flight service specialist training in weather related matters, an effective assignment of high priority to aviation weather, and the

expansion of weather data gathering and information locations through dual use of AES and FSS stations will do much to diminish weather related accidents.

Although in the early '70s, there may have been good cause to transfer the responsibilities for weather services to Environment Canada, that transfer has obviously caused problems to aviation which have yet to be resolved. In theory, Transport Canada establishes weather requirements and Environment Canada thereupon sets the standards. However, Mr. David M. Butler of Goodwood Data Systems questioned the effectiveness of the present relationship of Transport Canada and AES when he stated:

> "A We have a situation in Canada and I must stress that this situation is probably identical to that around the world, where the bureaucracy is organized so the Weather Department is in one cell and Transport is in another cell.
>
> And Canada is no different than any other country, as far as I can gather, unless there is the military jurisdiction where both come under military.
>
> And I think, over the years, as a casual observer, in some cases we have seen instruments concerned with weather shift from Transport to Environment and back to Transport and so on. In other words, the interface itself is obviously changing with time. I believe that AES' jurisdiction is to produce the weather or meteorological methodology, if you like. In other words, they have to assess that the techniques are good, the techniques are accurate and, once they are established, then they can then let another organization like Transport procure the system or have system control.
>
> I think now that there is one very important thing that I have observed some years ago - I think it is now starting to be corrected - and this is where Environment Canada tells Transport Canada what they're getting rather than Transport saying to Environment Canada, this is what we want.
>
> In other words, as we are going into new technology in weather systems - and I am referring here to storm warning, tornados, hail storms and so on - these systems have to be evaluated from a transportation safety aspect. I think everyone would be guilty if they were put into use without that very dedicated evaluation. But, if we don't start it, we won't finish it.
>
> Q Do I understand that your recommendation on this matter is that all weather services to aviation should be handled by the Department of Transport and not AES?
>
> A Unless there is expensive common equipment between the two and then that common equipment has to be designed so that both can use it equally. And I am talking here of satellites and other related things.

But, if there is a need for Transport for 100 per cent of the time to use that equipment, essentially, they should own it."
(Emphasis added.)

I am of the opinion that if Environment Canada is to continue to provide weather service for aviation, the right of Transport Canada to determine the requirements should be fully recognized, and that weather services for those engaged in general aviation should be given a higher priority than is being presently provided.

I am also of the opinion that the number of hours devoted to instrument training should be increased to qualify for a night endorsement.

PART XIII

RECOMMENDATIONS

FLIGHT TRAINING AND LICENSING

1. All flight training should be based on a uniform course of instruction, the curriculum for which should be established by the Air Administration.

2. To this end, the distinction between the approved and standard (unapproved) courses of instruction should be abolished.

3. Ground school training should be included as part of the curriculum of the uniform course of instruction.

4. A time limit of one year should be imposed within which a candidate for a private pilot's licence must complete the flight training course.

5. The additional flight training necessary to obtain a commercial pilot's licence should be completed within one year.

FREE-LANCE INSTRUCTION

6. Free-lance instructors should be required to maintain course records in a manner established by the Air Administration.

7. These course records should form part of a student pilot's application for a licence to ensure that appropriate and adequate training based on the uniform course of instruction has in fact been carried out.

8. A candidate whose training has been obtained from a free-lance instructor should be required to submit to a flight test by a Transport Canada inspector as a condition for obtaining a licence.

EXAMINATIONS

9. The format of the written examinations necessary for the obtaining of a pilot's licence, and the method of determining a passing grade should be reviewed.

10. In future, certain subjects, such as weather, should be made mandatory, and the candidate should be required to obtain a passing grade in each mandatory subject.

11. A limit should be set on the number of times that a candidate could repeat the written examination or the flight test.

STANDARDS FOR FLIGHT SCHOOLS

12. Transport Canada should promulgate an Air Navigation Order establishing standards for flight training schools.

13. The standards for flight planning facilities, ground training facilities, aircraft maintenance facilities and other requirements as set out in the proposed ANO, entitled "Standards and Procedures for Air Carriers Operating Flight Training Schools" should form the basis of the Air Navigation Order to be promulgated.

INSTRUCTORS

14. All flight instructors teaching instrument flying should be required to have, or to have held within the last 24 months, an instrument rating.

15. All ground school instructors should be licensed on the basis of qualifications which should be established by the Air Administration.

THE PRIVATE PILOT

Licensing Requirements

16. All candidates should be required to undergo a minimum of 45 hours flight training to be eligible for a private pilot's licence.

17. At least five hours of the 45 hours minimum flight training should be devoted to instrument flight training.

Aeromedical Training

18. Basic aeromedical training should be included in the training syllabus for all pilots.

19. The cooperation of the Medical Services Branch, Health and Welfare Canada, should be sought in outlining the course and the nature of the training in aviation medicine which should be given, and in obtaining the sources available for such instruction.

NIGHT ENDORSEMENT

20. No pilot should be eligible for a night endorsement unless he has had a minimum of 20 hours devoted to instrument training.

THE COMMERCIAL PILOT

21. All additional flight instruction necessary to obtain a commercial pilot's licence should be obtained at a licensed flight school.

22. The minimum number of hours of flight training to obtain a commercial pilot's licence should be increased to 200 hours, and consideration should be given to increasing this minimum amount in the future.

23. The minimum ground school instruction for the obtaining of a commercial pilot's licence should be increased to 40 hours.

Comment

The proposed ICAO Annex 1 contains recommendations for a general upgrading of the qualifications and training of commercial pilots as well as of private pilots.

Although there was opposition to aspects of Annex 1 which would create a new and different nomenclature for various categories of licence, the upgrading of standards was generally favoured. In making these recommendations, I do not imply that other ICAO proposals relating to the upgrading of standards should be rejected. The present recommendations should be viewed as initial steps pointing to the minimum standards set forth in the ICAO Annex 1 proposal.

MAXIMUM FLIGHT TIME AND FLIGHT DUTY TIME

24. Legislation should be enacted establishing maximum flight times and flight duty times.

25. The Information Circular published in 1973, which recommended flight time and flight duty time limitations, should form the basis of the proposed legislation.

CREW COMPLEMENT

26. The principles enunciated in the Presidential Task Force on crew complement should be accepted in Canada.

AIRLINE TRAINING

27. During the next general inspection of air carriers by Transport Canada, a report should be prepared in each region evaluating the training programs of the air carriers.

28. These reports as to the adequacy of pilot training programs in the regions should be submitted to the Air Administrator.

PILOT PROFICIENCY

29. An annual flight check should be given to all commercial pilots who only fly single-engine aircraft under visual flight rules.

Comment

It is intended that commercial pilots with IFR ratings will continue to undergo annual or semi-annual checks to renew instrument ratings, and commercial pilots flying multi-engine aircraft for hire will continue to undergo pilot proficiency checks.

30. A biennial flight review for all private and commercial pilots should be introduced, pursuant to which a pilot, in order to prove current competency, would be obliged to undergo a flight review conducted by a flight examiner or a qualified flight instructor.

31. The successful completion of the flight review should be certified by the examiner.

32. Pilots who have, during the 24 month flight review period, successfully passed any other flight check recognized by the Department of Transport should be deemed to have satisfied the requirement of a flight review.

PILOT RECENCY

33. The pilot recency requirements, as set out in the ICAO Annex 1 Licensing Proposal, should be adapted and made mandatory.

Comment

If the recency time limits, as set forth in the ICAO Annex 1 Licensing Proposal, are found to create a hardship for seasonal pilots, a relaxation of these limits for such pilots could be considered.

34. CATA's licensing authority should act with dispatch when it receives information which indicates that a licence holder has lost the necessary skills to safely exercise the privileges of that licence.

FLIGHT TESTS

35. Steps should be taken to ensure that flight training standards inspectors have the capacity to monitor at least 10% of flight tests carried out in the regions.

36. All civil aviation inspectors employed by the Department of Transport should have at their disposal current flight manuals and other necessary current documentation, and to have current flight experience on aircraft with respect to which they are engaged in the course of their duties.

AIRCRAFT MAINTENANCE ENGINEERS

37. The Air Administration should adopt a policy which would foresee the eventual elimination of unstructured on-the-job training for aircraft maintenance engineers and its replacement by formal school training.

38. This policy should initially require a shorter formal trade school course complemented by on-the-job training, and a further schedule whereby over a period of years the formal school training would be increased and the obtaining of an aircraft maintenance engineer's licence through self-study would become unacceptable.

39. Transport Canada should designate avionics as a separate field for licensing purposes.

40. Aircraft maintenance engineers should be required to certify that they have exercised their AME privileges for not less than six months of the last 24 months preceding the submission date of the application for renewal of a licence, failing which a new application for a licence should have to be made.

41. Aircraft maintenance shops servicing commercial operators should be inspected on a regular basis by the Air Administration in order to ensure that aircraft maintenance engineering standards are being maintained.

AIR TRAFFIC CONTROLLERS

42. The Fact Finding Board process should be continued.

43. The sole function of the Fact Finding Board process should be directed to remedying any deficiencies in the aviation safety system.

44. The Administrative Inquiry process should be continued.

45. The sole purpose of the Administrative Inquiry should be to establish whether an air traffic controller has violated any provision of the Air Regulations or any order or direction made pursuant to those Regulations, or whether the air traffic controller is incompetent or physically unfit to exercise the rights and privileges of the licence.

46. In all cases where, pursuant to an Administration Inquiry, ministerial action of a cancellation or suspension of a licence ensues, the aggrieved party should have the right to appeal to a Civil Aviation Appeal Tribunal, the establishment of which I have previously recommended. In proceedings before the appeal tribunal, the rules of natural justice should be observed.

47. In any case where a Regional Controller of Civil Aviation determines that it is appropriate to embark upon an Administrative Inquiry with respect to an air traffic controller, he should be free to do so without having to obtain the prior approval of the Regional Manager of Air Traffic Services.

48. The Regional Director of Enforcement, a position which I have previously recommended should be created, should also have the right to initiate an Administrative Inquiry.

AIRPORT EMERGENCY PERSONNEL

49. Canada should continue to follow ICAO's standards and practices in providing airport emergency personnel and equipment.

50. Transport Canada should assume the responsibility for the opening of a path to the aircraft which is the subject of an emergency, and to make every effort to assist passengers and crew to escape.

51. Transport Canada should take steps to delineate the responsibility for the care of distressed passengers and crew once they have been removed to a safe distance from the accident site.

52. Transport Canada should enter into an agreement with the airline carriers setting forth those services to be provided by the carriers with respect to passengers and crew who are injured in an accident involving an aircraft owned by airline carriers.

53. If such an agreement cannot be achieved, Transport Canada should designate the appropriate responsibilities, and the role to be carried out by the airline carriers in the provision of such services.

54. In cases involving non-airline aircraft, Transport Canada should delineate the responsibility for the care of those injured once they have been removed to a safe distance from the accident site.

UNLICENSED PERSONNEL

55. A flight dispatcher's training manual should be prepared by the airline carriers and approved by Transport Canada.

56. Transport Canada's inspectors should inquire into whether the airline carriers are complying with the proposed Flight Dispatcher's Training Manual, once introduced, and whether the airline carriers are complying with the Cabin Attendants' Training Manual.

57. With the exception of the recommendations that I have made with respect to the licensing of those engaged in avionics, and for the accreditation of design approval representatives and airworthiness inspection representatives, the Department of

Transport should not, at the present time, license personnel who are engaged in occupations presently unlicensed.

WEATHER SERVICES

58. The right of the Department of Transport to determine the requirements for weather services provided by Environment Canada should be fully recognized.

59. Weather services being provided to those in general aviation should be given a higher priority than is presently in effect.

60. Flight service specialists should receive more meteorological training, and atmospheric environment personnel who provide weather services for aviation should undergo a program of familiarization in aviation, so that both services would be better equipped to meet the needs of the aviation community.

61. Consideration should be given to implementing the Pacholik/Flucke recommendation whereby all AES and FSS personnel would be trained to perform the dual function of weather data acquisition and the presentation of weather information to the aviation community.

LEGISLATION

62. A Regulation should be promulgated to give the Personnel Licensing Handbook the force of law.

SUMMARY OF RECOMMENDATIONS IN VOLUME 3

Recommendations numbered 1 to 63 can be found in Volume 1; recommendations numbered 64 to 138 can be found in Volume 2; and the recommendations in Volume 3 have been re-numbered in the summary as follows:

NAVIGATIONAL AIDS AND UNCONTROLLED AIRPORTS

AN AIR NAVIGATIONAL SERVICE BRANCH

139. The creation of a unified Air Navigational Service Branch within the Canadian Air Transportation Administration.

140. The Air Navigational Service Branch should be headed by a director who should report to the Director General, Civil Aeronautics.

141. The present functions and activities of the Air Traffic Control Branch, the Telecommunications & Electronics (Air) Branch and the Airways Section should be assumed and become the responsibility of the Air Navigational Service Branch.

142. Air Traffic Control, Telecommunications & Electronics (Air) and Airways should become sections within the Air Navigational Service Branch.

143. Flight service specialists presently within the Telecommunications & Electronics (Air) Branch should be assigned to the Air Traffic Control Section of the Air Navigational Service Branch with the view that the Telecommunications & Electronics (Air) Section be the maintenance and engineering arm of the Air Navigational Service Branch.

144. A comparable Air Navigational Service Branch should be established in each of the regions.

CONTROLLED AIRPORTS

145. The Air Administration should undertake a re-evaluation of all uncontrolled airports to determine whether a control tower is required at any of them.

146. In conducting the re-evaluation, the Air Administration should review the present criteria for the determination of the need for a control tower.

147. In the determination of whether a control tower is required, traffic should be the major but not the single criterion. Other factors such as the nature of the aircraft, their size and speed, the mix of traffic and the number of passengers being transported should also be taken into consideration in determining the appropriate criteria.

148. The program to reduce service during the quiet hours at those airports at which a control tower is presently in operation should not be resumed until the criteria for doing so have been re-examined and re-appraised in consultation with the aviation community and the local residents who are serviced by such control towers.

RADAR

149. The Air Navigational Service Branch should assume the responsibility for the finalization and implementation of the Radar Modernization Program.

150. The Air Navigational Service Branch should give the highest priority to an acceleration of the Radar Modernization Program with a view to replacing the present obsolete radar equipment as soon as possible.

151. The acquisition of new major equipment or systems should, whenever possible, be through the purchase or rental of "off-the-shelf" equipment rather than on the basis of an in house design.

152. The Air Navigational Service Branch should undertake a program for the relocation of uninterruptible power units which do not comply with present guidelines.

153. The Air Administration should impose a limitation on the use of the major airports, when such airports are operating at peak hours, by aircraft without transponders.

TERMINATION OF KENORA PRIMARY RADAR

154. The primary radar system at Kenora should be retained until equipment is available which is capable of performing the same functions as are presently being provided.

FLIGHT SERVICE STATIONS

155. The Air Navigational Service Branch should re-evaluate the criteria for the determination of the need for the installation of flight service stations. In such a re-evaluation traffic should not be the major criterion, but consideration should be given to terrain, weather or other hazardous flying conditions.

156. A flight service station should be established at those airports which are serviced by a scheduled air carrier where no flight service station presently exists.

157. All new flight service stations should be constructed so as to provide the flight service specialist with a clear view of the ramps, runways and approaches.

158. Flight service stations which do not afford the flight service specialists with a clear view of the ramps, runways and approaches should be relocated where present facilities exist.

159. A standard building design should be adopted for all new flight service stations.

160. Flight service specialists should be given the authority to control the presence of vehicles on the airside of an airport by the implementation of a positive vehicle advisory service.

161. No vehicle operator should be permitted on the airside areas of airports unless properly certified.

COMMUNICATIONS AT UNCONTROLLED AIRPORTS

162. The Air Navigational Service Branch should convene a meeting of Headquarters and Regional personnel together with interested parties to review the Mandatory Frequency Guidelines in light of operating experience.

163. In preparation for such a meeting, appropriate Regional personnel should prepare with respect to each airport in their regions:

(i) the proposed height of the cap of the Mandatory Frequency Zone for uncontrolled airports in the region;

(ii) the area of the Mandatory Frequency Zone where it is proposed on the basis of operating experience to vary it; and

(iii) the area of the Positive Control Zone where it is proposed on the basis of operating experience to vary it.

164. The Air Administration upon receiving the recommendations emanating from such a meeting should amend the Mandatory Frequency Guidelines if, in its opinion, the amendment or amendments are warranted, having regard to operating experience and the changes suggested at such a meeting.

165. All operative provisions of the Mandatory Frequency Guidelines, or any amendments which result from the review, should be made mandatory.

166. The Mandatory Frequency Zone should be capped at a height which would ensure that aircraft in the area of serious potential conflict are required to communicate on the designated mandatory frequency.

167. The mandatory frequency designated during the period when a control tower is closed should be the tower frequency, unless operating experience shows that pilots are being confused by the use of such frequency.

168. Reports required to be made by pilots should not be broadcast unless there has been no response from a ground station, or unless no ground station exists at the relevant location.

THE PROVISION OF OTHER AIR NAVIGATIONAL FACILITIES AND SERVICES

169. The Air Navigational Service Branch should assume the responsibility for the National Airspace Plan and all other planning with respect to the provision of new navigational aids or the replacement of existing navigational aids.

170. The Northern Ontario Area Master Plan should be circulated to air carriers, the Chiefs of the Treaty #9 Indian Bands and members of the public affected for their consideration and comment.

171. The Air Navigational Service Branch, after receipt of any recommendations following the distribution of a National Airspace Plan, should undertake a review of the plan.

172. In the determination of the necessity for other navigational aids, such as directional beacons and instrument landing systems, traffic should not be the major criterion to be applied. In the review recommended, greater regard must be given to the safety related requirements which result from the special hazards encountered when flying into airports in the remote areas, and to the fatal and other accidents attributed to the absence of navigational aids. Consideration should also be given to the method used by the Federal Aviation Administration for the quantifying of the safety benefits as a result of the installation of navigational aids.

173. Transport Canada, in association with other appropriate governmental agencies, should immediately embark on a program to train native people in the remote areas of Canada in order to provide them with the skills required for radio operations, airport maintenance and weather data interpretation, and thus enable them to provide advisory service to aircraft similar to the program referred to as the

Arctic Airports program established in the Yukon and the Northwest Territories, and to the program in Northern Manitoba.

A GROUND PROXIMITY WARNING SYSTEM

174. A Ground Proximity Warning System should be made mandatory for all aircraft engaged in the carriage of passengers for hire.

TRAFFIC MIX

175. The Air Navigational Service Branch should give consideration to the establishment of satellite airports for use by VFR aircraft where major airports have become saturated by reason of traffic.

176. Where a satellite airport is not feasible, parallel runways at high density traffic airports should be considered for use by VFR aircraft.

177. As an interim solution, the Air Administration should adopt a regulation similar to the Federal Aviation Administration Regulation Part 93 which would require an operator of an aircraft flying VFR to obtain a departure or arrival reservation from the air traffic controller at designated high density traffic airports.

AIRCRAFT WITHOUT RADIO (NORDO)

178. In addition to the areas where they are not presently allowed, aircraft not equipped with a functioning two-way radio should not be allowed to operate within the Mandatory Frequency Zone of any aerodrome licensed by Transport Canada, save in cases of emergency.

AIR TRAFFIC CONTROLLERS

179. Air Traffic Controllers should receive frequent recurrent training in the procedures and methods to be adopted by them in the event of radar failures.

SEARCH AND RESCUE (SAR) AND EMERGENCY LOCATOR TRANSMITTERS (ELTS)

180. The Department of Transport assume the overall responsibility for search and rescue.

181. The search and rescue operation be carried out by the Department of National Defence.

182. An agreement between Transport Canada and the Department of National Defence with respect to their respective roles in the field of search and rescue be formalized.

183. New legislation be enacted making mandatory a requirement that each civil aircraft be equipped with a serviceable emergency locator transmitter, and the Air Navigation Order promulgated on July 27, 1974 and the Airworthiness Directive (ADCF-77-11) be repealed.

184. The specifications for the emergency locator transmitter be determined by Transport Canada rather than by the Department of Communications.

185. Air Navigation Order, Series V, No. 12, called The Order Respecting the Carriage of Emergency Equipment and Radio Communications Systems in Sparsely Settled Areas, be reviewed and updated.

PERSONNEL

FLIGHT TRAINING AND LICENSING

186. All flight training should be based on a uniform course of instruction, the curriculum for which should be established by the Air Administration.

187. To this end, the distinction between the approved and standard (unapproved) courses of instruction should be abolished.

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Licensing Requirements

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228. The sole function of the Fact Finding Board process should be directed to remedying any deficiencies in the aviation safety system.

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230. The sole purpose of the Administrative Inquiry should be to establish whether an air traffic controller has violated any provision of the Air Regulations or any order or direction made pursuant to those Regulations, or whether the air traffic controller is incompetent or physically unfit to exercise the rights and privileges of the licence.

231. In all cases where, pursuant to an Administration Inquiry, ministerial action of a cancellation or suspension of a licence ensues, the aggrieved party should have the right to appeal to a Civil Aviation Appeal Tribunal, the establishment of which I have previously recommended. In proceedings before the appeal tribunal, the rules of natural justice should be observed.

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233. The Regional Director of Enforcement, a position which I have previously recommended should be created, should also have the right to initiate an Administrative Inquiry.

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240. A flight dispatcher's training manual should be prepared by the airline carriers and approved by Transport Canada.

241. Transport Canada's inspectors should inquire into whether the airline carriers are complying with the proposed Flight Dispatcher's Training Manual, once introduced, and whether the airline carriers are complying with the Cabin Attendants' Training Manual.

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WEATHER SERVICES

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245. Flight service specialists should receive more meteorological training, and atmospheric environment personnel who provide weather services for aviation should undergo a program of familiarization in aviation, so that both services would be better equipped to meet the needs of the aviation community.

246. Consideration should be given to implementing the Pacholik/Flucke recommendation whereby all AES and FSS personnel would be trained to perform the dual function of weather data acquisition and the presentation of weather information to the aviation community.

LEGISLATION

247. A Regulation should be promulgated to give the Personnel Licensing Handbook the force of law.

SUMMARY OF ALL RECOMMENDATIONS IN VOLUMES 1, 2 and 3

ACCIDENT AND INCIDENT INVESTIGATION AND REPORTING

AN INDEPENDENT TRIBUNAL

1. The creation of a tribunal independent of any department of government to be called the "Canadian Aviation Safety Board".

JURISDICTION

2. The Canadian Aviation Safety Board should have the jurisdiction to investigate all civil aircraft accidents.

3. The Canadian Aviation Safety Board should have the jurisdiction to investigate all civil aircraft incidents.

4. The Canadian Aviation Safety Board should have the jurisdiction to investigate all potentially hazardous practices and situations in civil aviation.

5. The Canadian Aviation Safety Board's jurisdiction should be limited to aviation, and the consideration of a multi-modal tribunal should be postponed.

6. The enabling legislation creating the Canadian Aviation Safety Board should include a statement of objective underlining the fact that aircraft accident and incident investigations are conducted in order to determine the facts, conditions and circumstances relating to each accident or incident and the probable cause thereof, with a view to ascertaining measures which will best tend to prevent similar accidents or incidents in the future, and not for the purpose of apportioning blame or liability.

7. The enabling statute should make it clear that the tribunal is not a judicial body nor a regulatory authority.

STATUS OF INTERESTED AND INVOLVED PARTIES

8. The tribunal should have the authority and discretion to assign to the accident investigation team experts from the Air Administration, various associations, or other individuals who may have special knowledge of the problem being inquired into so long as such experts or individuals demonstrate objectivity, reserving the right of removal if objectivity is not maintained.

9. The Canadian Aviation Safety Board should be empowered to grant observer status to those who may have a direct interest in the subject matter of the investigation, but who are not assigned to the investigation team.

REPORTS

10. Before the issuance of a report, anyone who has a direct interest in the findings of the Canadian Aviation Safety Board should be made aware of the draft report before it is finalized and have an opportunity to make submissions.

11. In receiving submissions of involved or interested parties, the Canadian Aviation Safety Board should be free to receive them in a manner which it deems most helpful in carrying out its objects and in a non-adversarial atmosphere.

12. The Canadian Aviation Safety Board should not be bound by the rules which govern judicial or quasi-judicial bodies, or administrative tribunals which determine the rights of parties, but should have the obligation of considering the submissions made to it.

13. There should be no appeal from any findings of the Canadian Aviation Safety Board.

14. Where an investigation has been undertaken by the Canadian Aviation Safety Board, a report should be prepared and in every case be made public.

15. The Canadian Aviation Safety Board should have the right to reconsider its findings even after publication of its report.

SAFETY RECOMMENDATIONS

16. Whenever possible, a report published by the Canadian Aviation Safety Board on an accident or an incident should include safety recommendations, which should be general in nature.

17. All recommendations should be forwarded to the appropriate division or section of the Air Administration, and in matters of urgency the Canadian Aviation Safety Board should be authorized to forward its findings and recommendations, even though tentative, before the completion of its report to such appropriate department.

18. The Air Administration, which has the responsibility to determine what action, if any, is to be taken in response to such recommendations, must advise the Canadian Aviation Safety Board, in writing, within a period of ninety days after it has been notified of the Board's findings and recommendations, or such longer period as the Board may permit, of what action, if any, it has taken or proposes to take in response to those findings or recommendations. If the Air Administration determines that no action should be taken, its reasons for arriving at that conclusion must also be stated, which response should also be a matter of public record.

INCIDENT REPORTING SYSTEM

19. A voluntary incident reporting system should be introduced on an experimental basis for a period of years, following which further consideration can be given to the necessity of a mandatory incident reporting system.

20. The voluntary incident reporting system should be administered by the Canadian Aviation Safety Board.

21. All incident reports should be made directly to the Canadian Aviation Safety Board.

22. The enabling statute should provide that the incident report could not be used against the reporter in any criminal or disciplinary proceedings.

23. The investigator should be free to make such use of the report as is necessary for the promotion of aviation safety, but the anonymity of the person making the report should be protected.

24. The public report which must follow any investigation should not identify the reporter.

25. The enabling statute should provide that there should be no production of the incident report to those outside the tribunal.

26. The enabling statute should provide that the incident report should not be subject to production pursuant to the proposed Access to Information Act.

PUBLIC INQUIRIES

27. Whenever the Canadian Aviation Safety Board considers that a public inquiry is necessary in the interests of aviation safety, it should conduct such inquiry pursuant to the provisions of the Inquiries Act provided, however, that in any case in which it appears to the Canadian Aviation Safety Board appropriate it may:

   (a) request the Governor in Council to cause an inquiry to be made under Part I of the Inquiries Act; or

   (b) by order, establish a public inquiry, and designate the person or persons to preside over the public inquiry.

TRANSITIONAL PROVISIONS

28. The present function of the Aviation Safety Investigation Division of the Aviation Safety Bureau should be assumed and become the responsibility of the Canadian Aviation Safety Board.

29. The present function of the Aviation Safety Engineering Division of the Aviation Safety Bureau should be assumed and become the responsibility of the Canadian Aviation Safety Board.

30. The present function of the Aviation Safety Analysis Division of the Aviation Safety Bureau should be assumed and become the responsibility of the Canadian Aviation Safety Board.

31. The present function of the Aviation Safety Promotion Division of the Aviation Safety Bureau should be assumed and become the responsibility of the Canadian Aviation Safety Board.

32. The activities and personnel of each of the aforesaid divisions should be transferred to the Canadian Aviation Safety Board.

33. The transfer of the activities and personnel of the Aviation Safety Engineering Division should not prevent its services being available to the Air Administration to assist it in its functions, such as Airworthiness, and arrangements should be made between the Air Administration and the Canadian Aviation Safety Board for the sharing of the services of this important facility.

34. Regional aviation safety officers should form part of the Aviation Safety Promotion Division or its equivalent under the jurisdiction of the Canadian Aviation Safety Board.

35. The Air Administration should also have its own aviation safety promotion division.

COMPOSITION OF BOARD

36. The Canadian Aviation Safety Board should be composed of not less than three members. The members of the Board should be appcinted by the Governor in Council for a term certain and be eligible for re-appointment.

REPORT TO PARLIAMENT

37. The Canadian Aviation Safety Board should report annually to Parliament through a minister of the Crown other than the Minister of Transport.

PRIVILEGE WITH RESPECT TO EVIDENCE OBTAINED BY INVESTIGATORS

Cockpit Voice Recordings

38. The enabling statute should provide that cockpit voice recordings are privileged and are not to be disclosed save as is hereinafter recommended.

39. The investigators and the Canadian Aviation Safety Board should have free access to cockpit voice recordings.

40. The investigators and the Canadian Aviation Safety Board should be free to use so much of the recording as is relevant in the manner that they think necessary in the interests of aviation safety.

41. The investigators and the Canadian Aviation Safety Board should be at liberty to disclose to parties who may have a direct interest in the matter under investigation so much of the contents of the recording as may be necessary to pursue an orderly investigation and, if deemed necessary in the interest of aviation safety, to produce in their report, or make public at a public inquiry, such portions of the recording which bear on their findings.

42. Those portions of the recording which do not relate to a contributing cause of the accident or incident under investigation should not be volunteered by either the investigators or the Canadian Aviation Safety Board and should not be delivered up unless required to do so by law.

43. The carrier, which owns the cockpit voice recorder, should be forbidden to disclose the contents of the recording or produce it, other than as authorized by law.

44. The cockpit voice recording or any transcript thereof should be produced in civil proceedings when, in the opinion of the judge, the public interest in the proper administration of justice outweighs the importance of any reasons advanced for maintaining confidentiality.

45. The cockpit voice recording or any transcript thereof should not be used against any members of the crew in any criminal or disciplinary proceedings.

46. The enabling statute should provide that the recording or any transcript thereof obtained by investigators from cockpit voice recorders should not be subject to production pursuant to the proposed Access to Information Act.

Air Traffic Control Tapes

47. The investigator and the Canadian Aviation Safety Board should have the right to make such use of air traffic control tapes as is necessary for the conduct of an orderly investigation and, where they think it necessary, to publish such portions of the tape as may be needed to explain their findings in their reports.

48. The investigator and the Canadian Aviation Safety Board should not volunteer the contents of the air traffic control tapes, nor should they be produced other than as authorized or required by law.

49. No special rule of privilege should attach to the use of air traffic control tapes in civil proceedings.

50. Air traffic control tapes should not be used as evidence against any pilot or air traffic controller in any criminal proceedings or disciplinary proceedings save as provided for in any Collective Agreement.

51. Air traffic control tapes should be subject to the proposed Access to Information Act and subject to the review provisions envisaged in that Act in the event that exemption is claimed.

Witnesses' Statements

52. No rule of absolute privilege should be attached to any witnesses' statements obtained by accident investigators.

53. Investigators should not assure confidentiality to witnesses being interviewed.

54. Save for such publication as is necessary in the interest of promoting aviation safety, the accident investigators should not reveal any information obtained from witnesses other than when authorized or required to do so by law.

55. In civil proceedings where a claim of privilege is asserted, if in the court's judgment the public interest in the proper administration of justice outweighs in importance the confidentiality attached to the statement, the court may order the production and discovery of the statement, subject to such restrictions or conditions as the court deems appropriate. Failing a claim of privilege, the ordinary rules of admissibility of such statements should govern.

56. Investigators should have the right to compel persons being interviewed to answer questions put to them, and the enabling statute should provide that such answers are not admissible in evidence against the maker in criminal or disciplinary proceedings.

57. Witnesses' statements should be subject to the proposed Access to Information Act and subject to the review provisions envisaged in that Act in the event that exemption is claimed.

58. The investigator should be empowered to demand information from physicians of those patients who may have been involved in an aircraft accident, but this provision should only apply in provinces where the physician is obliged to provide such information when required to do so by law.

THE ACCIDENT INVESTIGATOR AS A WITNESS

59. There should be no statutory provision granting immunity to accident investigators from testifying in judicial proceedings.

60. A duty should be imposed on the Canadian Aviation Safety Board to confer with the Attorney General of the province, the Chief Coroner of the province, or other responsible Ministers of the provincial Crown, and to make every reasonable effort to enter into an agreement which would eliminate conflict and a duplication of effort with respect to matters which are of mutual concern, such as:

(1) the right to possession of the wreckage of an aircraft;

(2) the seizure of remains;

(3) the conduct of autopsies;

(4) the exchange of information;

(5) the possession of relevant documents;

(6) the attendance of federal investigators summoned to appear at coroners' inquests;

(7) the delegation by federal authorities to provincial authorities and, vice versa, of matters where there is a duplication of effort.

MR. HAROLD A. FAWCETT

61. No further disciplinary action or other proceedings should be taken against Mr. Fawcett, and in the event of the creation of an independent tribunal, he should be given an opportunity to serve the new tribunal.

MR. WILLIAM M. HOWES

62. No further disciplinary action or other proceedings should be taken against Mr. Howes.

DR. FRANCOIS DUBE

63. No further disciplinary action or other proceedings should be taken against Dr. Dube, but his work in the future should be limited to the field of aviation medicine and he should not form part of any accident investigation team.

ENFORCEMENT

ENFORCEMENT REORGANIZATION

(1) Headquarters

64. The creation of a separate Enforcement Branch of the Air Administration headed by a Director of Enforcement.

65. The authority of the Minister to take enforcement action should be delegated to the Director of Enforcement.

66. The function of the Enforcement Branch and of the Director of Enforcement should be the enforcement of the Aeronautics Act, the Air Regulations and subordinate legislation which has the force of law.

67. The objective of the Enforcement Branch should be to obtain compliance with the aviation safety standards lawfully promulgated.

68. The Director of Enforcement should develop a coherent enforcement policy to be published in an enforcement manual provided to all enforcement specialists and should seek to achieve uniformity in all the regions.

69. The enforcement policy should recognize the respective roles of detection, conciliation and imposition of administrative and judicial penalties in obtaining compliance as hereinafter set forth.

70. The enforcement policy should recognize aviation safety as the paramount consideration in determining when and what enforcement action should be taken with due regard to public convenience and economic consequences.

71. The enforcement policy should require that vigorous enforcement action will be taken with respect to all deliberate breaches of the aviation safety standards which derogate from safety.

72. The enforcement policy should set forth that concern about potential political consequences should not be taken into consideration in the determination of enforcement action.

73. The enforcement policy should recognize that the laws will be fairly and equally enforced and that all persons and corporations are equal in the eyes of the law.

74. The CATA/Air Canada Liaison Committee should cease to play a role in pending enforcement proceedings against Air Canada.

(2) <u>Regions</u>

75. The creation of an Enforcement Branch in every region and headed by a Regional Director of Enforcement.

76. The Regional Director of Enforcement should have the delegated authority to take enforcement action in all matters relating to general aviation and local air carriers.

77. The regional enforcement specialists should be located in an area close to the aviation community, and there should be sub-regional offices in each of the regions to provide a greater presence of the enforcement specialists in the aviation community.

(3) <u>Manpower</u>

78. There should be the addition of sufficient enforcement specialists to provide each region with not less than three such specialists.

79. An effort should be made to assign one enforcement specialist with special expertise to each of the fields of general aviation, air carriers and maintenance in each of the regions.

80. All civil aviation inspectors and airworthiness inspectors should be utilized in the enforcement process when infractions are detected by them and in a manner useful to the enforcement specialists.

81. All enforcement specialists, civil aviation inspectors and airworthiness inspectors should receive special training in enforcement procedures.

82. The Department of Justice should make available a lawyer in each region who would assist the enforcement organization on a full-time basis .

ADMINISTRATIVE PENALTIES

83. The enabling legislation should provide for the imposition of the following administrative penalties:

    (a) The cancellation or suspension of any licence, certificate or document of entitlement issued by or under the authority of the Minister;
    (b) The levying of a fine by administrative action to be exercised by the Director of Enforcement.

84. The enabling statute should authorize that, in cases of urgency, a temporary cancellation or suspension of a licence, certificate or document of entitlement could be made without notice.

85. Except in cases of urgency, no administrative penalty should be imposed unless preceded by a written notice specifying the breach complained of and a reasonable opportunity has been afforded for a response in writing.

A CIVIL AVIATION APPEAL TRIBUNAL

86. The creation of a Civil Aviation Appeal Tribunal to hear and review all appeals with respect to any administrative enforcement action taken by the Director of Enforcement or the Regional Director.

87. The members of the Civil Aviation Appeal Tribunal should be appointed by the Governor-in-Council and be responsible to the Minister of Transport.

88. The Civil Aviation Appeal Tribunal should be a quasi-judicial body governed by the rules of natural justice.

89. The proceedings before the Civil Aviation Appeal Tribunal should be by way of a hearing de novo.

90. Any suspension of a licence, certificate or document of entitlement should remain in effect pending review by the Civil Aviation Appeal Tribunal.

91. Any administrative fine, subject to appeal, should not be payable pending disposition by the Civil Aviation Appeal Tribunal.

92. The Civil Aviation Appeal Tribunal, in the disposition of an appeal, should have the authority to make such order as it deems appropriate.

JUDICIAL PENALTIES

93. Penalties for the breach of the laws governing aviation safety should be substantially increased, and the more serious offences should be punishable by either summary conviction or by indictment at the option of the Crown.

94. In those cases where it is determined to proceed by way of prosecution, prosecutions should not be preceded by a show-cause letter of allegation.

COOPERATION WITH THE RCMP

95. The Director of Enforcement and the Commissioner of the RCMP should confer with a view to reaching agreement for cooperation in the prosecution of offences under the *Aeronautics Act* and the subordinate legislation, and for the training of enforcement specialists, civil aviation inspectors and airworthiness inspectors.

UNLICENSED CHARTERERS

96. The enforcement agencies of the Air Administration and of the Canadian Transport Commission should coordinate in proceedings against those persons or corporations who carry passengers for hire without a carrier's licence issued by the Canadian Transport Commission and an operating certificate issued by Transport Canada.

97. The enabling legislation should authorize any court, which convicts an offender for carrying passengers for hire without the appropriate licences, to order forfeiture of the aircraft.

98. Any person or corporation who has been convicted of carrying passengers for hire without the appropriate licences should be prohibited from obtaining a carrier's licence from the Canadian Transport Commission or an operating certificate from Transport Canada for a minimum period of one year.

AUDIT PROCEDURES

99. A program for the unannounced audit of air carriers should be instituted where there is reason to believe that an operation is being carried on which endangers aviation safety.

REINSTATEMENT OF OPERATING CERTIFICATES

100. No reinstatement of an operating certificate following suspension should be granted without a careful inquiry by the enforcement agency to satisfy itself that the matters which brought about the suspension had been corrected, and there is reasonable grounds to believe that the operator will in future comply with the safety standards.

LEGISLATION

101. The Aeronautics Act, the Air Regulations and subordinate legislation should be redrafted, simplified and consolidated.

102. The enabling statute should specifically authorize the Minister to delegate his enforcement authority to appropriate officials and to specify those who may in turn sub-delegate such authority.

WEATHER MINIMA

103. The standards as regards weather minima in precision and non-precision instrument approaches should be revised and up-dated as suggested in the 1978 Departmental study entitled "Investigative Analysis of Instrument Approach and Takeoff Minima, Phase I".

104. In redrafting the legislation, an objective standard with respect to weather limits should be observed.

105. The look-see practice as it applies to weather minima should be restricted for all precision and non-precision instrument approaches, other than in cases of emergency.

106. With the adoption of enforceable weather minima, a sustained effort should be undertaken to enforce these minima.

107. Any authorizations to certain carriers and corporate owners to conduct operations to weather limits other than as prescribed by regulation should be discontinued.

108. Wherever possible, precision instruments for objective weather reporting, such as transmissometers, should be installed at airports where the traffic warrants.

PROPOSED RULE CHANGES

109. A procedure should be instituted for advance notice of proposed rule changes affording those affected an opportunity to be heard before the change is implemented.

AIRWORTHINESS

A CANADIAN AIRWORTHINESS CODE

110. The Aeronautics Act, the Air Regulations and subordinate legislation relating to airworthiness should be redrafted to provide a comprehensive Airworthiness Code.

111. The revision of the legislation referred to should be carried out by the Aeronautics Task Force in consultation with the aviation community.

112. The Federal Aviation Airworthiness Regulations and the Federal Aviation Operational Regulations of the United States should be used and adapted as the model for a Canadian Airworthiness Code, supplemented by such special conditions based on our own experience and required for Canadian aviation purposes.

113. Airworthiness standards should be related to the use proposed for the aircraft rather than by its weight.

114. For the purposes of determining the appropriate airworthiness standards, corporate aircraft should be equated with aircraft used for commercial air carrier purposes.

115. Commercial air carriers currently using aircraft of a gross take-off weight of under 12,500 pounds should be given a reasonable period of time to comply with the upgrading requirements of the proposed Federal Aviation Airworthiness and Operational Regulations to permit them to do so without undue financial hardship.

DESIGN APPROVAL FOR U.S. AND OTHER FOREIGN AIRCRAFT

116. With respect to aircraft manufactured in the United States of America, Canada should respect the Bilateral Agreement and accept the Certificate of Airworthiness for export of the competent American authority subject to compliance with any special conditions required to be met by United States' manufacturers as specified in the Canadian Airworthiness Code as provided for in Recommendation No. 3.

117. The current practice of the validation of transport category aircraft manufactured in the United States for export to Canada should be discontinued and replaced by a program for the familiarization of the aircraft by the Canadian airworthiness authority, and the determination that any special Canadian airworthiness conditions have been complied with.

118. Consideration should be given to the entering into of agreements similar to the Bilateral Agreement between Canada and the United States with other foreign countries having a history of providing responsible aircraft type approval and certification.

DOMESTIC TYPE APPROVAL AND CERTIFICATION

119. Tests essential for the determination of the airworthiness of the aircraft should be monitored by the Airworthiness Branch or its delegates.

120. Records should be made of such tests.

121. The records of such tests should be preserved as long as the aircraft's continuing airworthiness is under the surveillance of the Airworthiness Branch.

CONTINUING AIRWORTHINESS

122. The Airworthiness Branch should be reorganized to provide for a continuing Airworthiness Division with a view to placing greater emphasis on continuing airworthiness. Employees within the Air Administration should be assigned to the continuing Airworthiness Division with particular responsibility for that task.

123. The continuing Airworthiness Division should be responsible for the careful compilation, monitoring and analysis of Service Bulletins and Airworthiness Directives.

124. A training program should be introduced to enable personnel working within the continuing Airworthiness Division to be better qualified to interpret Airworthiness Directives affecting aircraft being operated in Canada.

125. Manufacturers of aircraft should be obliged to forward to the continuing Airworthiness Division all Service Bulletins relating to all aircraft operating in Canada.

126. The Airworthiness Code should require that operators and others, having knowledge of any matter or incident that may affect the airworthiness of the aircraft discovered during flight, ground operations or maintenance, report the same to the continuing Airworthiness Division.

127. The continuing Airworthiness Division should inquire into every matter or incident where the airworthiness of an aircraft is brought into question and should satisfy itself that all corrective measures have been taken to assure the continuing airworthiness of the aircraft.

128. The continuing Airworthiness Division should immediately review and re-evaluate the Aviation Safety Deficiency Notifications received by it to date, and should report to the Administrator on the action to be taken, or provide the reason for not taking action in response to such notifications.

DELEGATION OF AUTHORITY

129. The Design Approval Representative and the Airworthiness Inspection Representative systems should be continued subject to the changes hereinafter recommended.

130. The Approved Company systems should be continued subject to the changes hereinafter recommended.

131. The Design Approval Representatives and the Airworthiness Inspection Representatives should be licensed or accredited by Transport Canada.

132. The role and responsibilities of the Design Approval Representatives and the Airworthiness Inspection Representatives should be codified in the Airworthiness Code.

133. The Airworthiness Code should provide that no Design Approval Representative or Airworthiness Inspection Representative should be dismissed by an employer without the approval of Transport Canada, but which approval should not be withheld unless the dismissal was by way of reprisal because of the representative having carried out his obligation to Transport Canada.

134. The Airworthiness Code should provide that an Approved Company should not depart from the Maintenance and Overhaul Manual without prior reasonable notice to the Airworthiness Branch.

AIRWORTHINESS INSPECTORS

135. Airworthiness inspectors should be provided with additional clerical assistance which would permit them to spend greater time in the field and to maintain a greater presence in the aviation community.

DEPARTMENTAL AIRCRAFT

136. Immediate action should be undertaken to remedy the aviation safety deficiencies disclosed in the 1975, 1978, 1979 and 1981 audits of departmental aircraft.

137. The Minister of Transport should retain outside consultants to monitor the implementation of the changes that are necessary with a view to seeing that the departmental aircraft are maintained and operated in a manner consistent with the relevant safety standards and in a manner to set an example for all commercial air carriers.

138. The consultants should report to the Minister of Transport as to the progress being made to correct the aviation safety deficiencies disclosed in the respective audits and should advise the Minister whether the necessary improvements are being made with due dispatch.

NAVIGATIONAL AIDS AND UNCONTROLLED AIRPORTS

AN AIR NAVIGATIONAL SERVICE BRANCH

139. The creation of a unified Air Navigational Service Branch within the Canadian Air Transportation Administration.

140. The Air Navigational Service Branch should be headed by a director who should report to the Director General, Civil Aeronautics.

141. The present functions and activities of the Air Traffic Control Branch, the Telecommunications & Electronics (Air) Branch and the Airways Section should be assumed and become the responsibility of the Air Navigational Service Branch.

142. Air Traffic Control, Telecommunications & Electronics (Air) and Airways should become sections within the Air Navigational Service Branch.

143. Flight service specialists presently within the Telecommunications & Electronics (Air) Branch should be assigned to the Air Traffic Control Section of the Air Navigational Service Branch with the view that the Telecommunications & Electronics (Air) Section be the maintenance and engineering arm of the Air Navigational Service Branch.

144. A comparable Air Navigational Service Branch should be established in each of the regions.

CONTROLLED AIRPORTS

145. The Air Administration should undertake a re-evaluation of all uncontrolled airports to determine whether a control tower is required at any of them.

146. In conducting the re-evaluation, the Air Administration should review the present criteria for the determination of the need for a control tower.

147. In the determination of whether a control tower is required, traffic should be the major but not the single criterion. Other factors such as the nature of the aircraft, their size and speed, the mix of traffic and the number of passengers being transported should also be taken into consideration in determining the appropriate criteria.

148. The program to reduce service during the quiet hours at those airports at which a control tower is presently in operation should not be resumed until the criteria for doing so have been re-examined and re-appraised in consultation with the aviation community and the local residents who are serviced by such control towers.

RADAR

149. The Air Navigational Service Branch should assume the responsibility for the finalization and implementation of the Radar Modernization Program.

150. The Air Navigational Service Branch should give the highest priority to an acceleration of the Radar Modernization Program with a view to replacing the present obsolete radar equipment as soon as possible.

151. The acquisition of new major equipment or systems should, whenever possible, be through the purchase or rental of "off-the-shelf" equipment rather than on the basis of an in house design.

152. The Air Navigational Service Branch should undertake a program for the relocation of uninterruptible power units which do not comply with present guidelines.

153. The Air Administration should impose a limitation on the use of the major airports, when such airports are operating at peak hours, by aircraft without transponders.

TERMINATION OF KENORA PRIMARY RADAR

154. The primary radar system at Kenora should be retained until equipment is available which is capable of performing the same functions as are presently being provided.

FLIGHT SERVICE STATIONS

155. The Air Navigational Service Branch should re-evaluate the criteria for the determination of the need for the installation of flight service stations. In such a re-evaluation traffic should not be the major criterion, but consideration should be given to terrain, weather or other hazardous flying conditions.

156. A flight service station should be established at those airports which are serviced by a scheduled air carrier where no flight service station presently exists.

157. All new flight service stations should be constructed so as to provide the flight service specialist with a clear view of the ramps, runways and approaches.

158. Flight service stations which do not afford the flight service specialists with a clear view of the ramps, runways and approaches should be relocated where present facilities exist.

159. A standard building design should be adopted for all new flight service stations.

160. Flight service specialists should be given the authority to control the presence of vehicles on the airside of an airport by the implementation of a positive vehicle advisory service.

161. No vehicle operator should be permitted on the airside areas of airports unless properly certified.

COMMUNICATIONS AT UNCONTROLLED AIRPORTS

162. The Air Navigational Service Branch should convene a meeting of Headquarters and Regional personnel together with interested parties to review the Mandatory Frequency Guidelines in light of operating experience.

163. In preparation for such a meeting, appropriate Regional personnel should prepare with respect to each airport in their regions:

(i) the proposed height of the cap of the Mandatory Frequency Zone for uncontrolled airports in the region;

(ii) the area of the Mandatory Frequency Zone where it is proposed on the basis of operating experience to vary it; and

(iii) the area of the Positive Control Zone where it is proposed on the basis of operating experience to vary it.

164. The Air Administration upon receiving the recommendations emanating from such a meeting should amend the Mandatory Frequency Guidelines if, in its opinion, the amendment or amendments are warranted, having regard to operating experience and the changes suggested at such a meeting.

165. All operative provisions of the Mandatory Frequency Guidelines, or any amendments which result from the review, should be made mandatory.

166. The Mandatory Frequency Zone should be capped at a height which would ensure that aircraft in the area of serious potential conflict are required to communicate on the designated mandatory frequency.

167. The mandatory frequency designated during the period when a control tower is closed should be the tower frequency, unless operating experience shows that pilots are being confused by the use of such frequency.

168. Reports required to be made by pilots should not be broadcast unless there has been no response from a ground station, or unless no ground station exists at the relevant location.

THE PROVISION OF OTHER AIR NAVIGATIONAL FACILITIES AND SERVICES

169. The Air Navigational Service Branch should assume the responsibility for the National Airspace Plan and all other planning with respect to the provision of new navigational aids or the replacement of existing navigational aids.

170. The Northern Ontario Area Master Plan should be circulated to air carriers, the Chiefs of the Treaty #9 Indian Bands and members of the public affected for their consideration and comment.

171. The Air Navigational Service Branch, after receipt of any recommendations following the distribution of a National Airspace Plan, should undertake a review of the plan.

172. In the determination of the necessity for other navigational aids, such as directional beacons and instrument landing systems, traffic should not be the major criterion to be applied. In the review recommended, greater regard must be given to the safety related requirements which result from the special hazards encountered when flying into airports in the remote areas, and to the fatal and other accidents attributed to the absence of navigational aids. Consideration should also be given to the method used by the Federal Aviation Administration for the quantifying of the safety benefits as a result of the installation of navigational aids.

173. Transport Canada, in association with other appropriate governmental agencies, should immediately embark on a program to train native people in the remote areas of Canada in order to provide them with the skills required for radio operations, airport maintenance and weather data interpretation, and thus enable them to provide advisory service to aircraft similar to the program referred to as the Arctic Airports program established in the Yukon and the Northwest Territories, and to the program in Northern Manitoba.

A GROUND PROXIMITY WARNING SYSTEM

174. A Ground Proximity Warning System should be made mandatory for all aircraft engaged in the carriage of passengers for hire.

TRAFFIC MIX

175. The Air Navigational Service Branch should give consideration to the establishment of satellite airports for use by VFR aircraft where major airports have become saturated by reason of traffic.

176. Where a satellite àirport is not feasible, parallel runways at high density traffic airports should be considered for use by VFR aircraft.

177. As an interim solution, the Air Administration should adopt a regulation similar to the Federal Aviation Administration Regulation Part 93 which would require an operator of an aircraft flying VFR to obtain a departure or arrival reservation from the air traffic controller at designated high density traffic airports.

AIRCRAFT WITHOUT RADIO (NORDO)

178. In addition to the areas where they are not presently allowed, aircraft not equipped with a functioning two-way radio should not be allowed to operate within the Mandatory Frequency Zone of any aerodrome licensed by Transport Canada, save in cases of emergency.

AIR TRAFFIC CONTROLLERS

179. Air Traffic Controllers should receive frequent recurrent training in the procedures and methods to be adopted by them in the event of radar failures.

SEARCH AND RESCUE (SAR) AND EMERGENCY LOCATOR TRANSMITTERS (ELTS)

180. The Department of Transport assume the overall responsibility for search and rescue.

181. The search and rescue operation be carried out by the Department of National Defence.

182. An agreement between Transport Canada and the Department of National Defence with respect to their respective roles in the field of search and rescue be formalized.

183. New legislation be enacted making mandatory a requirement that each civil aircraft be equipped with a serviceable emergency locator transmitter, and the Air Navigation Order promulgated on July 27, 1974 and the Airworthiness Directive (ADCF-77-11) be repealed.

184. The specifications for the emergency locator transmitter be determined by Transport Canada rather than by the Department of Communications.

185. Air Navigation Order, Series V, No. 12, called The Order Respecting the Carriage of Emergency Equipment and Radio Communications Systems in Sparsely Settled Areas, be reviewed and updated.

PERSONNEL

FLIGHT TRAINING AND LICENSING

186. All flight training should be based on a uniform course of instruction, the curriculum for which should be established by the Air Administration.

187. To this end, the distinction between the approved and standard (unapproved) courses of instruction should be abolished.

188. Ground school training should be included as part of the curriculum of the uniform course of instruction.

189. A time limit of one year should be imposed within which a candidate for a private pilot's licence must complete the flight training course.

190. The additional flight training necessary to obtain a commercial pilot's licence should be completed within one year.

FREE-LANCE INSTRUCTION

191. Free-lance instructors should be required to maintain course records in a manner established by the Air Administration.

192. These course records should form part of a student pilot's application for a licence to ensure that appropriate and adequate training based on the uniform course of instruction has in fact been carried out.

193. A candidate whose training has been obtained from a free-lance instructor should be required to submit to a flight test by a Transport Canada inspector as a condition for obtaining a licence.

EXAMINATIONS

194. The format of the written examinations necessary for the obtaining of a pilot's licence, and the method of determining a passing grade should be reviewed.

195. In future, certain subjects, such as weather, should be made mandatory, and the candidate should be required to obtain a passing grade in each mandatory subject.

196. A limit should be set on the number of times that a candidate could repeat the written examination or the flight test.

STANDARDS FOR FLIGHT SCHOOLS

197. Transport Canada should promulgate an Air Navigation Order establishing standards for flight training schools.

198. The standards for flight planning facilities, ground training facilities, aircraft maintenance facilities and other requirements as set out in the proposed ANO, entitled "Standards and Procedures for Air Carriers Operating Flight Training Schools" should form the basis of the Air Navigation Order to be promulgated.

INSTRUCTORS

199. All flight instructors teaching instrument flying should be required to have, or to have held within the last 24 months, an instrument rating.

200. All ground school instructors should be licensed on the basis of qualifications which should be established by the Air Administration.

THE PRIVATE PILOT

Licensing Requirements

201. All candidates should be required to undergo a minimum of 45 hours flight training to be eligible for a private pilot's licence.

202. At least five hours of the 45 hours minimum flight training should be devoted to instrument flight training.

Aeromedical Training

203. Basic aeromedical training should be included in the training syllabus for all pilots.

204. The cooperation of the Medical Services Branch, Health and Welfare Canada, should be sought in outlining the course and the nature of the training in aviation medicine which should be given, and in obtaining the sources available for such instruction.

NIGHT ENDORSEMENT

205. No pilot should be eligible for a night endorsement unless he has had a minimum of 20 hours devoted to instrument training.

THE COMMERCIAL PILOT

206. All additional flight instruction necessary to obtain a commercial pilot's licence should be obtained at a licensed flight school.

207. The minimum number of hours of flight training to obtain a commercial pilot's licence should be increased to 200 hours, and consideration should be given to increasing this minimum amount in the future.

208. The minimum ground school instruction for the obtaining of a commercial pilot's licence should be increased to 40 hours.

MAXIMUM FLIGHT TIME AND FLIGHT DUTY TIME

209. Legislation should be enacted establishing maximum flight times and flight duty times.

210. The Information Circular published in 1973, which recommended flight time and flight duty time limitations, should form the basis of the proposed legislation.

CREW COMPLEMENT

211. The principles enunciated in the Presidential Task Force on crew complement should be accepted in Canada.

AIRLINE TRAINING

212. During the next general inspection of air carriers by Transport Canada, a report should be prepared in each region evaluating the training programs of the air carriers.

213. These reports as to the adequacy of pilot training programs in the regions should be submitted to the Air Administrator.

PILOT PROFICIENCY

214. An annual flight check should be given to all commercial pilots who only fly single-engine aircraft under visual flight rules.

215. A biennial flight review for all private and commercial pilots should be introduced, pursuant to which a pilot, in order to prove current competency, would be obliged to undergo a flight review conducted by a flight examiner or a qualified flight instructor.

216. The successful completion of the flight review should be certified by the examiner.

217. Pilots who have, during the 24 month flight review period, successfully passed any other flight check recognized by the Department of Transport should be deemed to have satisfied the requirement of a flight review.

PILOT RECENCY

218. The pilot recency requirements, as set out in the ICAO Annex 1 Licensing Proposal, should be adapted and made mandatory.

219. CATA's licensing authority should act with dispatch when it receives information which indicates that a licence holder has lost the necessary skills to safely exercise the privileges of that licence.

FLIGHT TESTS

220. Steps should be taken to ensure that flight training standards inspectors have the capacity to monitor at least 10% of flight tests carried out in the regions.

221. All civil aviation inspectors employed by the Department of Transport should have at their disposal current flight manuals and other necessary current documentation, and to have current flight experience on aircraft with respect to which they are engaged in the course of their duties.

AIRCRAFT MAINTENANCE ENGINEERS

222. The Air Administration should adopt a policy which would foresee the eventual elimination of unstructured on-the-job training for aircraft maintenance engineers and its replacement by formal school training.

223. This policy should initially require a shorter formal trade school course complemented by on-the-job training, and a further schedule whereby over a period of years the formal school training would be increased and the obtaining of an aircraft maintenance engineer's licence through self-study would become unacceptable.

224. Transport Canada should designate avionics as a separate field for licensing purposes.

225. Aircraft maintenance engineers should be required to certify that they have exercised their AME privileges for not less than six months of the last 24 months preceding the submission date of the application for renewal of a licence, failing which a new application for a licence should have to be made.

226. Aircraft maintenance shops servicing commercial operators should be inspected on a regular basis by the Air Administration in order to ensure that aircraft maintenance engineering standards are being maintained.

AIR TRAFFIC CONTROLLERS

227. The Fact Finding Board process should be continued.

228. The sole function of the Fact Finding Board process should be directed to remedying any deficiencies in the aviation safety system.

229. The Administrative Inquiry process should be continued.

230. The sole purpose of the Administrative Inquiry should be to establish whether an air traffic controller has violated any provision of the Air Regulations or any order or direction made pursuant to those Regulations, or whether the air traffic controller is incompetent or physically unfit to exercise the rights and privileges of the licence.

231. In all cases where, pursuant to an Administration Inquiry, ministerial action of a cancellation or suspension of a licence ensues, the aggrieved party should have the right to appeal to a Civil Aviation Appeal Tribunal, the establishment of which I have previously recommended. In proceedings before the appeal tribunal, the rules of natural justice should be observed.

232. In any case where a Regional Controller of Civil Aviation determines that it is appropriate to embark upon an Administrative Inquiry with respect to an air traffic controller, he should be free to do so without having to obtain the prior approval of the Regional Manager of Air Traffic Services.

233. The Regional Director of Enforcement, a position which I have previously recommended should be created, should also have the right to initiate an Administrative Inquiry.

AIRPORT EMERGENCY PERSONNEL

234. Canada should continue to follow ICAO's standards and practices in providing airport emergency personnel and equipment.

235. Transport Canada should assume the responsibility for the opening of a path to the aircraft which is the subject of an emergency, and to make every effort to assist passengers and crew to escape.

236. Transport Canada should take steps to delineate the responsibility for the care of distressed passengers and crew once they have been removed to a safe distance from the accident site.

237. Transport Canada should enter into an agreement with the airline carriers setting forth those services to be provided by the carriers with respect to passengers and crew who are injured in an accident involving an aircraft owned by airline carriers.

238. If such an agreement cannot be achieved, Transport Canada should designate the appropriate responsibilities, and the role to be carried out by the airline carriers in the provision of such services.

239. In cases involving non-airline aircraft, Transport Canada should delineate the responsibility for the care of those injured once they have been removed to a safe distance from the accident site.

UNLICENSED PERSONNEL

240. A flight dispatcher's training manual should be prepared by the airline carriers and approved by Transport Canada.

241. Transport Canada's inspectors should inquire into whether the airline carriers are complying with the proposed Flight Dispatcher's Training Manual, once introduced, and whether the airline carriers are complying with the Cabin Attendants' Training Manual.

242. With the exception of the recommendations that I have made with respect to the licensing of those engaged in avionics, and for the accreditation of design approval representatives and airworthiness inspection representatives, the Department of Transport should not, at the present time, license personnel who are engaged in occupations presently unlicensed.

WEATHER SERVICES

243. The right of the Department of Transport to determine the requirements for weather services provided by Environment Canada should be fully recognized.

244. Weather services being provided to those in general aviation should be given a higher priority than is presently in effect.

245. Flight service specialists should receive more meteorological training, and atmospheric environment personnel who provide weather services for aviation should undergo a program of familiarization in aviation, so that both services would be better equipped to meet the needs of the aviation community.

246. Consideration should be given to implementing the Pacholik/Flucke recommendation whereby all AES and FSS personnel would be trained to perform the dual function of weather data acquisition and the presentation of weather information to the aviation community.

LEGISLATION

247. A Regulation should be promulgated to give the Personnel Licensing Handbook the force of law.

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